**Determination of Physical Fitness Index (PFI) With Modified Harvard Step Test (HST) in Male and Female Medical Students of Age 17-19 Yrs**

* Dr. K. Ranjith Babu  
Dept. of Physiology, Viswabharathi Medical College, Kurnool, Andhra Pradesh, India  
* Corresponding Author

Dr. Mohit Malge  
Dept. of Physiology, Viswabharathi Medical College, Kurnool, Andhra Pradesh, India

Dr. Meenakshi S. Sable  
Dept. of Physiology, MNR Medical College, Sangareddy, Telangana, India

D. Pavani  
SRR College of Pharmaceutical Sciences, Karimnagar, Telangana, India

**ABSTRACT**

**Background & Objectives:** Harvard step test has been given much attention to select highly physically active persons who will be capable of doing hard work so that they may be recruited in various sports & games or appropriate industrial occupations. The present study was carried out in medical students to determine the Harvard Step Test (HST). There is significant difference in Harvard Index (HI) or Physical Fitness Index (PFI) in male and female students because males are generally more aggressive and accepts challenges more than females, also there is significant difference in Height (H) and Weight (W) in males and females. So, PFI affected by body size as evidenced in the co-relation PFI with height and weight.

**Methods:** The study was conducted in department of physiology, MNR Medical College, Sangareddy. A total of 133 subjects were selected, of whom 73 were male and 60 were female medical students whose age varied from 17 to 19 years. The subjects selected for this study were medical students admitted for First MBBS Course. The PFI or HI of the subjects was calculated by asking the subject to perform Harvard Step test. Prior to the test, age (Yrs), height (cm) and weight (kg) were recorded.

**Results:** In the present study, the mean Harvard Index or PFI was 83.0101 in males and 60.2425 in females. Mean values of height and weight were 170.5603cms & 56.3219kgs in males and 156.14cms & 49.2Kgs in females respectively.

**2. Methods and Materials:**  
A total of 133 subjects of which 73 were male and 60 were female whose age varied from 17 to 19 years. The subjects selected for this study were medical students admitted for MBBS Course after obtaining Institutional Ethical Clearance. They were not practicing any athletic event. Informed consent was obtained from all participants. The study was conducted in the department of physiology, MNR Medical College, Sangareddy.

All the subjects were familiarized with Hardward step test. The procedure of this method is that subject took rest for 5 minutes prior to test and initial pulse was noted Ask the subject to perform the exercise of ascending and descending Harvard step of 16” (40cm) height 20 times per min for 5 min (Brouha et al., 1943). It he gets exhausted earlier then note the time for which he was able to perform the test. Time is noted with the help of stopwatch. At the end of test ask the subject to sit immediately on chair count the pulse and record it during 1 to 1-1/2 min to 2 to 2/1/2 min to 3 to 3/1/2 min interval. Total of these three reading is called recovery pulse. Convert the duration of exercise in seconds and fatigue index or Harvard index is calculated as follows,

$$HI = \frac{\text{Duration of exercise in seconds}}{2 \times \text{recovery}} \times 100$$

Prior to the test age, height and weight were recorded. Student’s ‘t’ test were applied for statistical analysis for finding mean and standard deviation.

**3. Results:**  
The physical characteristics like age, height, weight and PFI of subject are given in table I. The classifications of fitness according to index are given in table II.
4. Discussion:
This modified HST is found to be height suitable for Indian men and women. It may be mentioned that all the subjects continued the exercise step test for 5 min. when step height was 16" with step frequency 20/min respectively. The finding in the present study suggests that there is significant difference in physical fitness index or Harvard index in male and female medical students because male is generally more aggressive and accepts challenge more than female (Ian Gregg et al., 1973). Also there is significant difference in height and weight in males than female so PFI affects by body size as evidenced in positive co-relation between PFI with height and weight (P K Banerjee et al., 1983). A similar observation was earlier made by Elbel et al., 1958 (Debnath P K et al., 1978) on male college students.

The lower men values of PFI in the female students compared with male students can thus be attributable to their lower body weight and height. This present study is an attempt to modify test with classification of score. It would be valid for untrained men and women. It may be mentioned that no physical explanation is given to modify the HST in any country (Brouha L et al., 1843). But for Indians with short stature, it is felt necessary to modify HST and its physiological and anthropometric relations are yet to be explored (Sunil K R et al., 1993).

Table – 1: Shows physical characteristics and PFI in male and female medical students (Mean ± SD)

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
<th>Height (cms) Mean</th>
<th>Weight (Kg) Mean</th>
<th>PFI (HI) Mean</th>
<th>Statistical Signature</th>
<th>'p' Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>73</td>
<td>170.5603</td>
<td>56.3219</td>
<td>83.0101</td>
<td>HS</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Female</td>
<td>60</td>
<td>156.1400</td>
<td>49.2000</td>
<td>60.2425</td>
<td>HS</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Table – 2: Classification of fitness according to Harvard index.

<table>
<thead>
<tr>
<th>Category</th>
<th>Harvard Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>&lt;55</td>
</tr>
<tr>
<td>Average</td>
<td>65-69</td>
</tr>
<tr>
<td>Good</td>
<td>80-89</td>
</tr>
<tr>
<td>Excellent</td>
<td>90 &amp; above</td>
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