

Original Research Article

STUDY OF CARDIOPULMONARY EFFICIENCY OF STUDENTS OF FIRST YEAR DENTAL (BDS) STUDENTS USING HARVARD STEP TEST

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ABSTRACT

Background: The Cardiopulmonary efficiency measures the physical fitness for Muscular work & the ability to recover from the work. The present study was undertaken to assess the cardiopulmonary efficiency using Harvard Step Test in young adult in the age group of 19 to 23 years with varying degree of physical activities.

Materials and Methods: Cross sectional study was done on 60 BDS Students and cardiopulmonary efficiency measured using Harvard step test. Statistical analysis was done using descriptive analysis and Chi square test.

Results: Among 60 study subjects, 30 were male & 30 female. Mean age of male was 19.9 years while of female was 19.3 years. Mean BMI of male was 25.31 kg/m² while of female was 21.30 kg/m². 26.66% of male subjects had excellent physical fitness whereas only 6.66% of females studied had excellent physical fitness. It was found that 36.66% of males studied had good physical fitness whereas only 10% of females studied had good physical activity. 6.66 % males have average physical fitness while 10% females have average physical fitness, 73.33% percent of the females had poor physical fitness whereas only 130% of males had poor physical fitness. Statistical analysis shows that physical fitness in BDS students is not satisfactory. And there is significant difference in cardiopulmonary efficiency between boys & girls.

Conclusion: Physical fitness of BDS students in Latur BDS College is not satisfactory and male are having better physical fitness.

Keywords: Physical fitness, Dental students, Cardiopulmonary efficiency, Harvard Step Test

INTRODUCTION

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

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. Cardiopulmonary efficiency implies the

capacity for skill full performance and rapid recovery.^[3]

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.^[3] Present study was aimed to study cardiopulmonary efficiency of students of 1st year BDS students using Harvard step test.

MATERIALS AND METHODS

Present study was Cross sectional study, conducted in Department of Physiology, at MIMSR Medical College, Latur, Maharashtra, India. Study duration was of 1 years (i.e. from July 2022 to June 2023).

Study was approved by institutional ethical committee.

Inclusion criteria

- Healthy young male & female BDS students, age between 19 to 23 years, willing to participate in present study

Exclusion criteria

- Student with Locomotor & Musculoskeletal disability
- History of Cardiovascular disorder
- History of Respiratory disorders
- History of Diabetes mellitus, Hypertension
- History of Major surgery in the recent past
- History of Drug intake
- History of Alcohol & Smoking

Study was explained to participants in local language & written informed consent was taken. Cross sectional study was done on 60 BDS Students and cardiopulmonary efficiency measured using Harvard step test.

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 (sitting) 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.

Cardiopulmonary Efficiency Scoring

The Subject was advised to step up on the Harvard steps of height (Male 20 Inches /50.8 cm, Female: 18 Inches / 45 cm), once every two seconds (30 per minute) for 5 minutes, At one, three and five minutes during the test, pulse rate was recorded as-

- (a) P1 (Pulse Rate 1) -1 min after exercise for 30 sec.
 - (b) P2 (Pulse Rate 2) _2 min after exercise for 30 sec.
 - (c) P3 (Pulse Rate 3) -3 min after exercise for 30 sec.
- CPE-Duration of exercise in seconds x 100/2(pulse 1+2+3)

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive analysis and Chi square test.

RESULTS

As shown in [Table 1] that among 60 study subjects, 30 were male & 30 female. Mean age of male was 19.9 years while of female was 19.3 years. Mean BMI of male was 25.31 kg/m² while of female was 21.30 kg/m².

Table 1: Profile of subjects

| Gender | Number | Mean Age (years) | Mean BMI (kg/m ²) |
|--------|--------|------------------|-------------------------------|
| Male | 30 | 19.9 | 25.31 |
| Female | 30 | 19.3 | 21.30 |

Cardiopulmonary efficiency rating was done as given in [Table 2].

Table 2: Cardiopulmonary efficiency rating

| Fitness Index | Rating |
|---------------|--------------|
| Excellent | 90 and above |
| Good | 70-89 |
| Average | 50-69 |
| Poor | <49 |

As shown in [Table 3] that there were 26.66% of male subjects had excellent physical fitness whereas only 6.66% of females studied had excellent physical fitness. It was found that 36.66% of males studied had good physical fitness whereas only 10% of females studied had good physical activity. There were 6.66%

males have average physical fitness while 10% females have average physical fitness 73.33% percent of the females had poor physical fitness whereas only 30% of males had poor physical fitness. The result was significant at p<0.05. The chi-square test is 8.32. The P-value is 0.039684.

Table 3: CPE scoring Fitness Index

| | Male (n=30) | Female (n=30) | Total (n=60) | P-value |
|-----------|-------------|---------------|--------------|---|
| Excellent | 08 (26.66%) | 02 (6.66%) | 10 (16.66%) | $\chi^2 = 8.32$ d.f. = 6 P=0.039684 |
| Good | 11 (36.66%) | 03 (10%) | 14 (23.33%) | |
| Average | 02 (6.66%) | 03 (10%) | 05 (8.33%) | |
| Poor | 09 (30%) | 22 (73.33%) | 31 (51.66%) | |

DISCUSSION

Inadequate physical activity is responsible for approximately 30% of all deaths mainly due to heart disease, diabetes & colon cancer.^[4] 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. Beginning an active lifestyle could significantly reduce mortality from these events.^[5,6] Regular physical exercise is known to have beneficial effects even in the untrained person and in diseased states like diabetes, obesity & hypertension.

Several studies have established that cardiopulmonary fitness is necessary to carry out daily task. The effect of regular exercise is known to have beneficial effect on health.^[7,8] Importance of Cardiopulmonary 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.^[9]

The present study evaluated the cardiopulmonary fitness of young BDS students using Harvard step method. This method has four grades of cardiopulmonary fitness based on the scoring obtained after performing step test. This is proven to be a suitable method for assessing physical fitness of Indians.^[10]

The present study showed that fitness of BDS students is less, and males are having excellent physical fitness when compared to their female counterparts. 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 Dentist to know their level of present fitness and try to improve it.

CONCLUSION

Cardiopulmonary fitness of BDS students in MIDSR Dental College, Latur, Maharashtra is not satisfactory. This may be due to the sedentary life

style and lack of sporting activities & also over emphasis on academic pursuits. Females are having better cardiopulmonary fitness as most of them are pursuing in some physical activity.

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