

## **An Investigation on Cardiovascular Efficiency among Veterinary College Students of Hassan District, Karnataka**

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### **Abstract**

Cardiovascular tests may be given for any of several purposes within the school or college setting. One purpose, and probably the most common, is as part of a physical fitness test battery in classifying and rating students for assessing status and important. Cardiovascular tests may be utilized by the physical education for the purpose of research. This may be in the form of observational research in which measures are taken to status or for establishing norms; or tests may be given before and after a training programme in order to measure improvement.

The purpose of the study is to analyze the effect of exercise on the heart and circulatory system (cardiovascular efficiency) and to measure the general body capacity of the B.V.Sc & AH students of Veterinary College, Hassan. An attempt is also made in present study to find out the physical efficiency index (PEI) and fitness index (FI), i.e. cardiovascular efficiency among B.V.Sc & AH students, Veterinary College, Hassan. To achieve the purpose of the study thirty (30) B.V.Sc & AH students of Veterinary College, Hassan were selected from different departments of College for the study.

It is concluded that the mean scores of physical efficiency index all the B.V.Sc & AH students are in good category according to standard norms. According to mean scores of Fitness Index all B.V.Sc & AH students are in good category according standard norms. Overall results clearly indicated that the cardiovascular efficiency of B.V.Sc & AH students is good. Overall results clearly indicated that B.V.Sc & AH students are having the fitness level to perform their daily physical activities in an effective and efficient manner. Also the results of the study will help to classify all the B.V.Sc & AH students into different categories according to standard norms.

**KEYWORDS:** Cardiovascular efficiency, cardiovascular endurance, Heart rate, Cardio respiratory fitness

### **INTRODUCTION:**

In the sports and games physical fitness plays a vital role in the improvement of the player's performance, especially at the competitive level. Therefore, physical fitness in sports and games has become Indispensable for superior performance.

Today almost everyone in the world give great importance to the development of sports in order to improve the nation's health and for the well being of the future generation. Hence a large number of governmental and pre-governmental organizations in close collaboration with private bodies administer and slipperiest the development of sports. Certain like GDR and USSR even by to project the superiority

of their political ideology and their political and social systems through an achievement in the field of sports.

Physical fitness has always been one of the foremost goals of physical education. The measurement of physical fitness and methods of developing fitness have been topics of national concern through the years.

Physical exercises, as stated earlier, are the principle means of training. It is therefore most importance for the coach and sportsman to know the purpose or effect of the exercises to be used. There are too many exercises and it is impractical to discuss the effect of each exercise separately. It is purposeful to classify the exercises into groups according to their effect. The classification of physical exercises has to be done in a scientific and systematic manner.

The effect of physical exercise on the complex sports performance in sport can be judged basically by selecting some parameters of exercise.

Load structure of physical exercise is the nature and degree of physical and physiological load on the organism.

To most people being in good shape or being physically fit is experienced by such feats as climbing several flights of stairs without being red in the face and breathing hard or by the ability to comfortably resume hiking, or cycling or jogging after scant few minutes rest. To put it in slightly more technical language, it means the ability of the circulatory and respiratory systems to adjust to and recover from the effects of exercise or work.

It is one of the key components of physical fitness, and to some physical trainers, physical educators and coaches it is the single most indicative measure of a person's physical condition.

Authorities on physical education have opined that the cardiovascular efficiency is the major component of physical fitness. Cardiovascular efficiency indicates organic vigor, physical health and physical condition.

To make the people one an enriched life, the above parameter is required to be maintained at optimum level. Therefore efforts shall be made at the state level to test physical condition. However, age, sex, habits and life styles influence the acquisition and maintenance of cardiovascular efficiency. Therefore the study in this area was undertaken by venturing the effect of cardiovascular efficiency on B.V.Sc & AH students of Veterinary College, Hassan.

#### **Utilization of cardiovascular tests:**

Cardiovascular tests may be given for any of several purposes within the school or college setting. One purpose, and probably the most common, is as part of a physical fitness test battery in classifying and rating students for assessing status and important.

Cardiovascular tests may be utilized by the physical education for the purpose of research. This may be in the form of observational research in which measures are taken to status or for establishing norms; or tests may be given before and after a training programme in order to measure improvement.

Perhaps one of the most important used of cardiovascular tests in which pulse rate are measured is as an educational device. In any case such tests can be very effective for their motivational properties and for the information that is derived concerning the circulatory and reparatory system.

### **Cardiovascular efficiency:**

Cardiovascular efficiency refers to the ability of the heart circulatory system to provide oxygen to cells to support the oxidative schemes of the body and to provide the energy.

### **Cardiovascular endurance:**

Cardiovascular endurance is the sustained occurrence of a chain of events in the body in which the nervous and endocrine systems direct the use of oxygen and nutrients to keep muscle cells contracting and relaxing in a coordinated manner without undue fatigue.

### **Cardio respiratory fitness:**

This refers to the fitness of your heart, lungs, and blood vessels. The better your cardio respiratory fitness, the better your stamina, the lower your risk for a host of diseases like heart disease, diabetes, and cancer.

Your ability to move without feeling winded or fatigued is measured by your VO<sub>2</sub>max (maximal oxygen uptake), a technical term that indicates how efficiently oxygen enters your lungs, moves into your bloodstream, and is used by your muscles. The more fit you become, the more efficiently your body transports and uses oxygen, improving your overall VO<sub>2</sub>max.

To test VO<sub>2</sub>max, physiologists ask you to cycle or walk or run on a treadmill with a tube-like mask over your mouth. The mask gathers the carbon dioxide and oxygen you exhale, and the ratio between the two gasses helps to indicate how efficiently your muscles use oxygen.

There are other tests that measure additional aspects of cardio respiratory fitness, including a lung function test, in which you take a deep breath and then blow into a tube to measure your lung capacity, and heart rate tests, taken both at rest and during exercise. Since equally fit people can vary as much as 20 percent in heart rate, this measure best indicates your own progress: If you become more fit, your heart rate generally drops.

### **Heart rate and cardiovascular efficiency:**

Cardiovascular efficiency depends on a number of factors. One measure is called stroke volume, which is the volume of blood pumped per heartbeat. A fit individual has a larger stroke volume, which means a greater volume of oxygen is delivered to the body per heartbeat. This is also the reason fit people have a lower resting heart rate. As mentioned, muscles require a given amount of fuel, even at rest, which doesn't change with exercise training. Because exercise training has increased the volume of oxygen that can be delivered to muscles per heartbeat, the heart needs to beat less to do the same job. Therefore, the heart rate is lowered.

### **Difference between heart rate of athletes and non-athletes:**

Well-conditioned athletes will have a lower heart rate because their heart becomes stronger with more exercise. It becomes thicker and stronger and is able to pump out more blood with each beat (increased cardiac output).

### **Statement of the problem:**

The purpose of the study is to analyze the effect of exercise on the heart and circulatory system (cardiovascular efficiency) and to measure the general body capacity of the B.V.Sc & AH students of Veterinary College, Hassan. An attempt is also made in present study to find out the physical efficiency index (PEI) and fitness

index (FI), i.e. cardiovascular efficiency among B.V.Sc & AH students, Veterinary College, Hassan.

**Objectives of the study:**

1. To study the effect of exercise on the heart and circulatory system of the B.V.Sc & AH students of Veterinary College, Hassan.
2. To measure general capacity of the body and especially the heart and circulatory system to adopt and recover from the hard work.
3. To find out the physical efficiency index (PEI) and Fitness index (FI).
4. To test physical condition i.e., general endurance to perform daily exercises and skills in an effective and efficient manner.
5. To classify the individual into the standard norms constituted by American Scientist “BROUHA” (i.e., poor, low average, high average, good and excellent) and also classify into three groups,
  - Least fit.
  - Fit, and
  - Most fit

**Significance of the study:**

- This study helps to find measure general capacity of the body and especially the heart and circulatory system to adopt and the ability to recover from hard work.
- This study would assess the effect of exercise on the heart and circulatory system of the B.V.Sc & AH students of Veterinary College, Hassan. .
- The study would help to identify the physical condition i.e., general to perform daily exercises and skills in an effective and efficient manner.
- The results of the study may classify the individuals into the standard norms category. (i.e., poor, low average, high average, good and excellent) and also helps to classify into three groups.
  - i) Least fit
  - ii) Fit, and
  - iii) Most fit
- The results of the study help to find out the Physical efficiency index and (PEI) Fitness index (FI) of each player.
- The results of the study would be much help to the physical education teachers and coaches to find out the general capacity of the heart and circulatory system or general endurance of the players.
- A familiarity with certain norms of Harvard step test can help coaches to understand the physical efficiency or cardiovascular efficiency of the players.

**MATERIALS AND METHODS:**

**Subjects of the study:**

1. Thirty (30) B.V.Sc & AH students of Veterinary College, Hassan were selected from different departments of College for the study.

**Equipments and methods of the study:**

1. Bench: A stable bench or platform 18 inches high.
2. Stop watch or wall clock with a large minute hand.
3. A metronome – to count the cadence.

**Personnel:** Two testing assistants were appointed, one to look after the time and another count the pulse.

**Time allotment:** 5 minutes step test will require approximately 5 minutes administering to each individual.

**General procedure:**

1. Orientation of all students
2. Remaining students quietly seated until their turn.
3. Tester himself may do all the timing and calling out signal.
4. Pulse count – at wrist and carotid artery.

**Harvard Step Test:**

Brouha (1943) constructed a very simple and promising field test for measuring cardiovascular endurance of human beings by using easily available and inexpensive equipment. Originally, the test was developed on 220 college men by administering it simultaneously on small groups of students. This is probably the most common test of cardiovascular endurance used in India and also all over the world.

**Testing Procedure:**

The subjects were asked to step up and down on an 18 inch bench at the rate of 30 cycles per minute for a period of five minutes. Each cycle consists of four counts. In the first count the subject will step up on the bench with one foot, for the second count the other foot is also taken on to the bench to assume an erect body position, for the third count the lead leg is placed on the ground and for the fourth count the other foot is also placed on the floor.

At the end of the test, the subject was asked to sit down immediately on the bench and remain quite.

The pulse counts:      1 to 1 ½ minute  
                                     2 to 2 ½ minute  
                                     3 to 3 ½ minute

The pulse count are recorded on the score sheet

**Note:** The subject may change the lead off foot not more than three times during the time list.

If during the time limit, the subject fails to finish the test or if he cannot keep pace with the cadence and is stopped, his observer should record the actual time he performed.

If the subject does not continue to exercise for the prescribed time, his three pulse count should be taken from the point when he stopped exercising.

**Scoring:**

The score is calculated with data from the duration of the exercise in seconds and the sum of the three one half minute pulse counts.

**Additional pointers:**

- The short form correlates very highly with the long form and in the interest of time may be preferable to the long form.
- During the exercise the tester can help the subjects to maintain the cadence by calling out “up, up, down, down.” Even more effective is to make a tape recording of the cadence. This allows the tester to supervise all aspects of the testing more closely.
- When a subject is forced to stop prior to the end of the 5 minutes. It is an imperative that his duration of exercise be recorded and that the timing for the pulse taking after exercise be started. A large wall clock with a second hand is very valuable in these cases.

It is a simple matter for the counters to record the time at the start of the exercise, to record the time at which the subject is forced to stop, to begin

taking the pulse a minute afterwards for 30 seconds, and so on. Trained assistants may also serve in this capacity.

#### **Safety Precautions:**

- The principal safety factor is inherent in the test itself which is that the test is rather strenuous and might be dangerous of someone in poor health. This underlines the importance of medical examinations for all students and cautions against giving step test to persons known to have some abnormalities.
- About the only other safety precaution involves the possibility of the subject missing his footing and hitting his knee against the bench. Padding some kind is recommended. Sometimes a mat folded over a bench or bleacher will provide for the exact 20- inch height as well as serve as protective padding.

#### **Criterion Measures:**

The physical efficiency index (PEI) is calculated by using the formula,  
Duration of exercise in seconds X 100

$$PEI = \frac{\text{Duration of exercise in seconds} \times 100}{2 \times \text{Sum of pulse counts in recovery}}$$

Duration of exercise = 5 mts. (i.e. 300 in secs.)

Sum of pulse counts in recovery pulse counts from,

1 mt. to 1 ½ mts.

2 mts. to 2 ½ mts.

3 mts. to 3 ½ mts.

Total 3 pulse counts are added and divided by three to get sum of pulse counts in recovery.

Fitness Index (FI) is calculated by using the formula:

$$FI = \frac{\text{Duration of exercise in seconds} \times 100}{5.5 \times \text{pulse counts.}}$$

Pulse count = Once from one minute to one minute thirty seconds.

#### **Statistical techniques:**

To determine the cardiovascular efficiency of B.V.Sc & AH students, College of Veterinary, Hasan Mean, Standard deviation and 't' value were used to calculate the data.

#### **MATERIALS AND METHODS:**

The main objective of the study is to measure the cardiovascular efficiency i.e., to measure the general capacity of the body and especially heart and circulatory system to adopt and recover from hard work.

This study also has been to test the physical condition, i.e., general endurance to perform daily normal activities in an effective and efficient manner.

The study also helps to classify individuals into three groups,

- i) Least fit
- ii) Fit, and
- iii) Most fit

This study also help in finding the physical efficiency level of the each subject and to classify individuals and also to compare with the standard norms constituted by the American scientist 'BROUHA'. He tested 2200 male students at Harvard in the original validation of the step test. Taddonio and Karporich also found supporting evidence as to its validity. The following standard norms of performance have established after testing approximately 8000 college students:

**PEI**

Below 55 -----Poor  
 55 to 64 ----- low average  
 65 to 79 ----- High average  
 80 to 89 ----- Good  
 Above 90 excellent

The following norms have been established for interpretation, Fitness Index standard norms,

**FI**

Below 50 ----- Poor  
 50 to 80 ----- Average  
 Above 80 ----- Good

**Table No. 1**  
**Physical Efficiency Index (PEI) of Students**

S.N	PEI	Category	S.N	PEI	Category
1	98.68	Excellent	16	89.28	Good
2	93.16	Excellent	17	88.59	Good
3	96.77	Excellent	18	87.41	Good
4	92.59	Excellent	19	84.79	Good
5	86.58	Good	20	92.63	Excellent
6	88.75	Good	21	88.75	Good
7	84.56	Good	22	94.93	Excellent
8	88.75	Good	23	88.68	Good
9	95.54	Excellent	24	78.94	High average
10	97.40	Excellent	25	85.87	Good
11	88.71	Good	26	87.20	Good
12	89.28	Good	27	76.12	High average
13	91.46	Excellent	28	80.10	Good
14	85.76	Good	29	75.11	High average
15	93.75	Excellent	30	84.15	Good

**Table No. 2**  
**Physical Efficiency Index (PEI) Results of Students**

Categories	Frequency	Valid %
Excellent	10	34
Good	17	56
High Average	3	10
Total	30	100.0

According to the results of cardiovascular efficiency (PEI) 34% of B.V.Sc & AH students are classified into the excellent category, 56% of players classified into good category and 10% of players into high average category according to their performance in the Harvard Step Test.

According to the results it can be found that total 100% of the B.V.Sc & AH students are physically fit and are capable to perform daily normal physical activities

in an efficient manner in their discipline. According to the results and analysis it is found that all the students have got the average recovery rate after the effect of exercise.

**Table. No 3**  
**Fitness Index (FI) of Students**

S.N	FI	Category	S.N	FI	Category
1.	97.40	Good	16.	86.58	Good
2.	89.41	Good	17.	90.90	Good
3.	95.69	Good	18.	71.41	Average
4.	90.90	Good	19.	85.22	Good
5.	92.44	Good	20.	90.90	Good
6.	75.22	Average	21	86.58	Good
7.	81.41	Good	22	92.44	Good
8.	87.97	Good	23.	97.40	Good
9.	94.04	Good	24.	77.92	Average
10.	95.69	Good	25	80.21	Good
11.	73.91	Average	26	72.50	Average
12.	87.97	Good	27	80.20	Good
13.	89.41	Good	28	75.11	Average
14.	82.64	Good	29	70.50	Average
15.	92.36	Good	30	73.30	Average

**Table No. 4**  
**Fitness Index (FI) Results of Students**

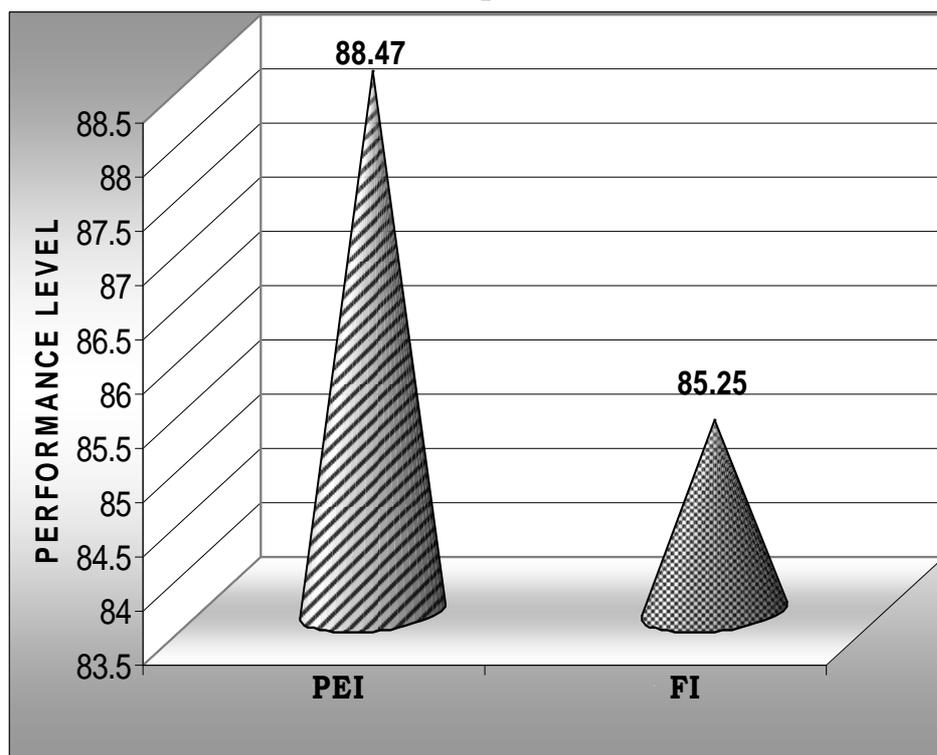
Categories	Frequency	Valid %
Good	22	73
Average	8	27
Total	30	100.0

According to the table. No. 3 & 4 the results of the Fitness Index 73% of the B.V.Sc & AH students are classified into good category and 27% of the players are classified into the average category according to their performance in the Harvard Step test.

According to the results, all the B.V.Sc & AH students have the fitness level to perform their daily physical activities in an effective manner.

**Table No.5**  
**Cardiovascular Efficiency of Students**

Sample		Cardiovascular Efficiency	
		P.E.I	F.I.
B.Sc (Vet) students	M	88.47	85.25
	SD	5.86	8.44

**Graph 1**

Results presented in the above Table and Graph presents the cardiovascular efficiency of B.V.Sc & AH students. According to physical efficiency and fitness index mean scores all B.V.Sc & AH students are under good category.

#### **CONCLUSIONS:**

1. According to mean scores of physical efficiency index all the B.V.Sc & AH students are in good category according to standard norms.
2. According to mean scores of Fitness Index all B.V.Sc & AH students are in good category according standard norms.
3. Overall results clearly indicated that the cardiovascular efficiency of B.V.Sc & AH students is good.
4. Overall results clearly indicated that B.V.Sc & AH students are having the fitness level to perform their daily physical activities in an effective and efficient manner.
5. Also the results of the study will help to classify all the B.V.Sc & AH students into different categories according to standard norms.

#### **RECOMMENDATIONS:**

- The same study may be conducted on girl's students.
- The similar study may be conducted on state, university, national and International players.
- The similar study may be conducted different age groups players.
- The result of the study will help the physical education teachers and coaches to plan their training and coaching schedules for the various sports players.

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