



COMPARISON OF RECOVER HEART RATE STATUS AMONG 4TH YEAR MALE SPORT SCIENCE SUMMER PROGRAM STUDENTS, WOLLEGA UNIVERSITY, ETHIOPIA

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ABSTRACT

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This study aimed to experiment, measure and evaluate the level of recovery heart rate among male sport science students of the summer program and to compare their mean with the standard status of the recover heart rate rating scale. From a total population of 80, the sample consisted of 40 male sports science students. The samples were selected by using a random sampling technique. The subjects were divided into two equal sections on a random basis (section A, and section B) consisting of 20 subjects in each group. Harvard step test was used to measure the recovery heart rate of the students' which is an index of cardiovascular fitness. To compare the mean differences among the students independent t test was applied with the help of SPSS (version, 20) Software. The level of significance was set at 0.05. The findings of the current study show that the mean value of recovery heart rate for section A was calculated 104.2 with S.D. 3.4 and section B was recorded 106.8 with S.D. 2.24 respectively. The t-value on recovery heart rate is 2.924 which are greater than the required table value (2.021) with 38 df. So there is a statically significant difference in the recovery heart rate variable between section A and section B sport science students. There were statistically significant mean differences in recovery heart rate among the section A and section B male students, also the recovery heart rate level of the subjects was below the standard level of recovery heart rate rating scale.

Contribution/Originality: This study contributes in the existing literature as the first investigation to comparatively examine the level of recovery heart rate among the students and to compare their mean with standard status of recover heart rate rating scale set by YMCA. The paper's contribution is increasing the participation of subjects in regular physical exercise which is important for preventing themselves from different chronic disease.

1. INTRODUCTION

The human body is created to function well when it is in an active condition. Physical fitness avoids an individual from being infected or suffers from illness; stay healthy both mentally and physically throughout their lives. In the short term, they can perform daily chores easily and able to prevent chronic diseases such as heart attack, high blood pressure, cancer, diabetes, and osteoporosis (Pilus *et al.*, 2010).

Physical fitness can be thought of as an integrated measure of most, if not all, the body functions (skeletal muscular, cardiorespiratory, hematocirculatory, psycho neurological and endocrine– metabolic) involved in

the performance of daily physical activity and/or physical exercise. Regular physical activity is an important component of a healthy lifestyle and helps to keep the body fit. Physical activity is any bodily movement produced by skeletal muscle that results in energy expenditure. Fitness is generally considered to have five components: aerobic capacity, muscle strength, muscular endurance, flexibility, and body composition. Hence, when physical fitness is tested, the functional status of all these systems is being checked. This is the reason why physical fitness is nowadays considered one of the most important health markers, as well as a predictor of morbidity and mortality for cardiovascular disease (CVD) and for all causes (Ortega *et al.*, 2008); Blair SN, (Darr *et al.*, 1988; Centers for Disease Control, 1990; Cole *et al.*, 2000) In the recent decade, a decline in physical activity among college students has been observed (Pitsavos *et al.*, 2004; Ruiz *et al.*, 2009).

Cardiovascular fitness represents the efficiency of the heart, lungs and vascular system in delivering oxygen to the working muscles so that prolonged physical work can be maintained (Cole *et al.*, 2000). The indicators of cardiovascular fitness have traditionally included such variables as resting heart rate (HR), resting blood pressure (BP), cardiac output, stroke volume (SV), maximum oxygen consumption (VO₂max), endurance capacity, HDL cholesterol, body fat, glucose-stimulated insulin, and total cholesterol levels. Thus a cardiovascular fit individual is expected to have a decreased resting HR, lower BP, increased cardiac output, increased SV, increase in VO₂max, increased work endurance capacity, increased HDL cholesterol, decreased total cholesterol, reduced glucose-stimulated insulin, decreased body fat and generally, increased heart function with an ability to pump more blood (Darr *et al.*, 1988).

Cardiovascular Endurance is the ability of the heart and lungs to supply oxygen-rich blood to the working muscle tissues and the ability of the muscles to use oxygen to produce energy for movement (National Physical Activity Guidelines Glossary, 2010). This type of fitness is a health-related component of physical fitness that is brought about by sustained physical activity (Frank Moran, 2010). A person's ability to deliver oxygen to the working muscles is affected by many physiological parameters, including heart rate, stroke volume, cardiac output, and maximal oxygen consumption.

Heart rate recovery can be defined as the rate at which the HR declines from either maximal or submaximal exercise to resting levels and has been identified as a powerful and independent predictor of cardiovascular and all-cause mortality in healthy adults (Nishime *et al.*, 2000; Ortega *et al.*, 2011; Fletcher *et al.*, 2014) in those with CVD and diabetes (Pitsavos *et al.*, 2004) It has also been reported to be a remarkable complement to the medical and physical assessment of an individual (Ruiz *et al.*, 2009). HR recovery to resting levels can take one hour after light or moderate exercise (Shetler *et al.*, 2001) four hours after long-duration aerobic exercise (Terziotti *et al.*, 2001) and even up to 24 hours after intense or maximal exercise and has been suggested to depend on the interaction among factors like exercise intensity (Shetler *et al.*, 2001; Watanabe *et al.*, 2001) cardiac autonomic modulation, and the level of physical fitness.

Regular exercise and physical activity (PA) have been shown to be beneficial by mitigating the risk of coronary heart disease, diabetes mellitus, obesity and other chronic diseases as well as improving mood, decreasing anxiety and playing an important role in improving health related quality of life. Similar beneficial effects have been well documented in older adults (U.S. Department of Health and Human Services, 1996). In this sense, data on recovery heart rate status of students in Wollega University seems to be scarce. Therefore, the aim of this study was to measure the recovery heart rate of students so that the results obtained can be very helpful to promote good health in the youth ages.

2. MATERIALS AND METHODS

2.1. Sampling and Sample Size

The present study has been carried out with the cooperation of the students of the sports science summer program, Wollega University. A sample of 40 male students were selected from the total of 52 male 4th year sport

science summer program by using random sampling technique. The subjects with any types of illness & injuries were excluded from the study. They were all informed about the study and followed by signatures on voluntary participation forms. The age of the subjects ranged between 26-36 years.

2.2. Instrumentation

The appropriate and reliable instruments were used with the study. For this study, the Harvard step test was used to gather the data. The instrument that used to measure recovery heart rate was 12-inch bench, box, or step; a metronome and stopwatch.

2.3. Data Collection Procedure

Date, time, and place of the test for this study have been decided. The test starts with all subjects gather together from each section and it was briefly explained on purpose of the study, procedures involved in the test and what the study need from them. Physical readiness questionnaire was given before the test day to check the subject's health. The day two progress for the test, the short briefing was given to the subject about how this study will be done and tester showed the demonstration of the test to let subjects know more clearly about the project research. The test was done in the same day for each section of the subject.

2.4. Recovery Heart Rate Assessment: An Index of Cardiovascular Fitness

YMCA3-minute step test

Objective: The 3-Minute Step Test measures your **aerobic (cardiovascular) fitness level** based on how quickly your heart rate returns to normal after exercise.

Equipment; 12-inch bench, box, or step; a metronome, calculator, and stopwatch.

Procedure; to measure the recovery heart rate, takes the pulse for 10 seconds immediately after the workout, then make a note of that number. Wait a full two minutes and take the pulse again for 10 seconds, also note the number. Measurement was taken from the radial artery with a fore finger and the middle finger of the right hand placed horizontally across the subject's wrist while sitting on the floor. After multiplying each record (pulse of 10 second X 6 = pulse in one minute) and Subtract the second number from the first. The resulting number is the recovery heart rate. Scoring the average of three trials was considered as a final score

What this measures: This test assesses your fitness level based on how quickly your heart rate recovers after exercise. The fitter you are, the quicker your heart rate will return to normal after exercise.

Scoring: Here are the age-adjusted standards based on guidelines published by YMCA (Robert Wood, 2018).

2.5. Ratings for Men, Based on Age

	18-25	26-35	36-45	46-55	56-65	65+
Excellent	50-76	51-76	49-76	56-82	60-77	59-81
Good	79-84	79-85	80-88	87-93	86-94	87-92
Above Average	88-93	88-94	92-88	95-101	97-100	94-102
Average	95-100	96-102	100-105	103-111	103-109	104-110
Below Average	102-107	104-110	108-113	113-119	111-117	114-118
Poor	111-119	114-121	116-124	121-126	119-128	121-126
Very Poor	124-157	126-161	130-163	131-159	131-154	130-151

3. STATISTICAL ANALYSIS

The Statistical Package for the Social Sciences (SPSS; version 20) was used for the data analysis. Independent t tests were used to assess recover heart rate between 4th year section A and section B male sports science. P values less than or equal to 0.05 were considered statistically significant.

4. RESULTS

Table-4.1. Comparison of recovery heart rate between 4th year section A and section B male sport science students

Variables	Group	N	Mean	St. d	St. error	Mean Difference	df	t- value	Sig
Recovery heart rate	Section A	20	104.2000	3.28634	.73485	2.60	38	2.924	.006
	Section B	20	106.8000	2.23842	.50053				

St.d= standard deviation, St. Significant at 0.05 level, Error = Standard error, df= degree of freedom=2.021 (38)

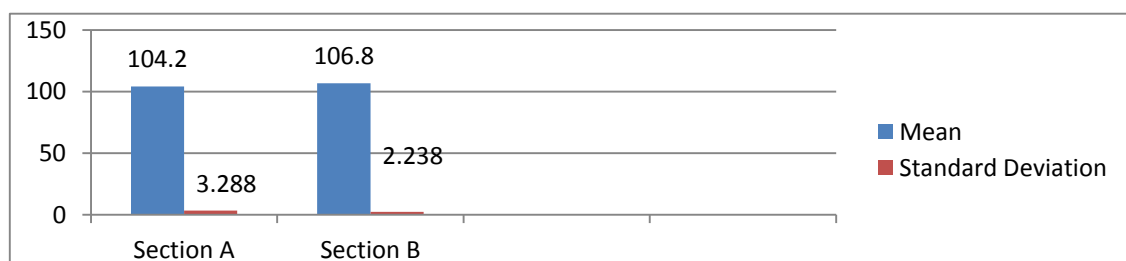


Figure-4.1. Mean and standard of recovery heart rate among section "A" and section "B" students

The table 4.1 and figure 4.1 indicates that mean value of recovery heart rate for section A was calculated 104.2 with S.D. 3.286 and section B was recorded 106.8 with S.D. 2.23842 respectively. The t-value on recovery heart rate is 2.924 which are greater than the required table value (2.021) with 38 df. So there is a statically significant difference on the recovery heart rate variable between section A and section B sport science students. This also indicated that the cardiovascular (recovery heart rate) performance of section A male summer sport science students are better than section B students.

Overall, the mean of both sections on recovery heart rate (104.2 and 106.8) shows that the recovery heart rate level of the subject under this study is below the average or rating scale according to the above information on table 3.1 (the age-adjusted standards fitness level or recovery heart rate rating scale based on guidelines published by YMCA).

5. DISCUSSION OF FINDINGS

The present study aimed to find out and compare means differences in recovery heart rate in between the group (section "A" and section "B" 4th year male summer program sport science students of Wollega University) and with the age-adjusted standard recover heart rate rating scale.

It was hypothesized that there would be a mean significant difference on recovery heart rate in between the sections and among the section and/with a standard recovery heart rate level rating scale. Analyzing raw data using independent t test was applied to test the significant means differences in order to prove the hypothesis already stated. The findings of this study clearly indicated that, statistically there was a significant means difference on recovery heart rate among the section A and section B male sport science students, also the result of the study shows that the recovery heart rate of the subjects was below the standard recovery heart rate status rating scale.

The recently published literature indicates that physical fitness is an important health marker for every people, (Ortega *et al.*, 2008; Pribis *et al.*, 2010) highlighting the need of meaningful and accurate physical fitness assessment in youth people. The correct interpretation of physical fitness assessment requires comparing the score obtained in a particular person with normative values for the general population with the same sex and age (Terziotti *et al.*, 2001). Low cardiorespiratory fitness is a prominent behavioral risk factor for cardiovascular disease (CVD) morbidity and mortality, as cardiorespiratory fitness is strongly associated with CVD outcomes. The results of present study showed that recovery heart rate which is an indicator of cardiovascular fitness was better in the section "A" male sport science students than section "B" male sport science students.

Our results are consistent with the findings of Jourkesh *et al.* (2011) which experiment, measure and evaluate the level of physical fitness among college students of Islamic Azad University (IAU), shabestar branch based on gender. The investigator concluded that Physical fitness performance was better in male students, except for sit and reach test, in which female students performed better.

6. CONCLUSION

Based on the result, the following conclusions were made:

1. The results of the present study confirm that recovery heart rate status of section A male sport science students are comparatively better than section B male sport science students in Wollega University.
2. The result of the study shows that the recovery heart rate status of 4th year male summer program sport science students are below the standard recover heart rate rating scale.
3. The results show that the subjects under the study might not be making regular physical activity which may lead them toward different chronic disease in their life.

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