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Selected Cardiorespiratory Fitness Indices of Undergraduate Students in Adekunle Ajasin University Akungba Akoko, Ondo State

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ABSTRACT

The study examined selected cardiorespiratory fitness indexes of undergraduate students of Adekunle Ajasin University, Akungba-Akoko, Ondo State. Two (2) research questions were raised and four (4) hypotheses were formulated and tested at 0.05 level of significance using t-test statistical analysis to guide the study. An expo-facto research design was used for data collecting. Purposive sampling technique was used to select a sample size of 60 student comprised 25 males and 35 females. The findings revealed that there is no significant relationship between heart rate and established norms of AAUA student, there is no significant relationship between systolic blood pressure and established norms of AAUA student, there is no significant relationship between diastolic blood pressure and established norms of AAUA student and there is no significant relationship between Vo2max and norms of AAUA student; it was recommended university management should make physical activities compulsory for students regardless of their level, the State Government should organize seminars/workshop to sensitize the general public on the need to engage in physical fitness exercise and Adekunle Ajasin University students should make physical fitness exercise a priority.

Key words: Cardiorespiratory, VO2 max, blood pressure.

INTRODUCTION

Background of the study

The cardiovascular system can be seen as a big system with smaller parts functioning in order to maintain optimal execution. The major parts involved are the lungs, heart and overall systemic vasculature (arteries, veins, etc.). These parts work as an integral unit in order to transport oxygenated or deoxygenated blood around the body. To summarize in simple terms, the more fit a person is, the better the transfer of oxygen from the lungs to the minor blood vessels; consistent cardiovascular exercise will also improve the performance of the heart as a pump and will increase the efficiency of blood transport into the surrounding vasculature. The constant flow of blood will also aid in maintaining the elasticity of your blood vessels. Lastly, the likelihood of plaque or other blood vessel difficulties are a lot less with a healthy cardiovascular system. Cardiorespiratory fitness is the most important fitness indexes that needs lots of monitoring and maintenance [1]. The American College of Sports Medicine (ACSM 2017) guidelines are well known in the sports science realm as one of the better sources for prescribing doses of exercise from. The reason for this claim is that ACSM does not only deal with one component of fitness. Instead, ACSM goes into more depth when it comes to strength training or cardiovascular exercise. Speaking about cardiovascular exercise, the ACSM guidelines recommend at least 500 kcal/week of expenditure through cardiovascular exercise to see a huge reduction in cardiovascular disease or risk of mortality; to reach another drop in the risk of these conditions, one would have

to exercise up to 1000 kcal/week. Another good thing about the ACSM guidelines is that the requirements are simple and can even be reached through obtaining 10,000 steps a day, for example [2-4].

According to WHO statistics, coronary disease is the leading cause of global, more than even the sum of all cancer related death [4-6]. In recent years with advances in cardiac rehabilitation, coronary disease mortality in developed countries has been significantly reduced [7]. Cardiac rehabilitation has a 55 years old development history, and metal analysis show that exercise based cardiac rehabilitation can reduce all cause fatality rate by 8%-37% and reduce cardiac fatality rate by 7%-38% in patients with coronary disease [8,9]. According to Taylor (2017) cardio respiratory fitness, or aerobic capacity, which is often reflected by VO_2 max is one of the main concerning parameters in cardiac rehabilitation. Low aerobic capacity is a strong predictor or cardiac and all-cause mortality. Even a small increase VO_2 max can improve the functional level in activities of daily living, therefore leading to better quality of life. In recent years, researchers have become increasingly interested in investigating possible impacts of physical activity and physical fitness on cognitive functions and several studies have suggested that higher physical fitness level are associated with cognitive benefit [10]. Physical fitness is the human body's ability to move with speed, balance, agility and strength attained through adequate exercise and nutrition. Brandon (2009), described physical fitness as the ability to carry out daily task with vigor and alertness without undue fatigue and with enough energy to enjoy one time pursuit and unforeseen circumstances and emergencies [11].

A state of adequate physical fitness is the ability to handle undue stress and daily occupations without becoming fatigued. The human body is created to function well when it is in an active condition. Physical fitness prevents an individual from being infected or suffering from illness, and assists them in staying healthy both mentally and physically throughout their lives. The regular practice of physical exercise is an important factor to reduce mobility of cardiovascular and all other conditions, there also seems to have further and independent benefits from the practice of physical exercise and improvement of the aerobic conditions which peaks for their being practiced more and more frequently [12-14].

Over the past 30 years maximal aerobic capacity (VO_2 max) has emerged as a strong predictor of adverse health outcomes such as cardiovascular disease and all-cause mortality (32,42) [15-18]. Exercise training is an effective means of achieving improvements in VO_2 max, with a rise of one metabolic equivalent (3.5 ml O_2 $kg^{-1}min^{-1}$) in VO_2 max associated with a 10%-25% improvement in survival. Thus, exercise training represents a potentially important preventative approach to reduce the risk of disease development in currently healthy adults. Similar to any form of preventative medicine, there is a need for exercise prescription to be optimized with the goal of prescribing the most effective exercise intensity for improving VO_2 max. Despite the obvious importance of identifying the optimal intensity of exercise training for improving VO_2 max, there is surprisingly little evidence available describing what this intensity, or range of intensities might be. Exercise-training programs consisting of extended duration, continuous exercise at a moderate intensity (endurance training) have long been known to improve VO_2 max. More recently repeated intervals of short duration high-intensity exercise (interval training) have been demonstrated to be an effective alternative to end for improving VO_2 max Interestingly, while several researchers report the potency of high-intensity training at improving VO_2 max. While many investigators have reported the ability of a wide range of both high and low intensity exercise-training intensities to improve VO_2 max, whether an optimal intensity exists for increasing VO_2 max remains unclear. This represents a critical gap in our understanding of the response to exercise training. While individual studies have failed to characterize the optimal training intensity, the combination of accumulated results through meta-regression and meta-analysis may provide additional information on the impact of training intensity on VO_2 max.

The above approach will allow for both an examination of the magnitude of training-induced increases in VO_2 max across a large range of training intensities (i.e. submaximal continuous to supra-maximal all-out interval exercise) and the larger sample size will improve the external validity (i.e. generalizability) of results obtained from numerous smaller training studies. For any living soul to enjoy his or her health, cardiorespiratory fitness places pivotal health in gaining optimum health. For undergraduate students to perform at a very efficient level, this fitness components is of necessity. Many studies have centered on the mental growth and development, infrastructural needs, academic and sports performances but not many of these studies worked on physiological cardiorespiratory fitness indexes of undergraduates in institution tertiary institutions in Ondo State. Also the researcher observed that searching through the literatures, there are few students and data bank on this topic in Africa. Documented records of fitness capacity and regular assessment of current levels of fitness will go a long way in evaluating aerobic fitness indexes of the

Undergraduate Students in Adekunle Ajasin University. An increase in the occurrence of chronic diseases (e.g. Coronary Heart Disease (CHD), obesity, hypertension, diabetes, overweight etc.). It is on this ground the researcher evaluated the cardiorespiratory physical fitness of the selected Undergraduate Students in Adekunle Ajasin University.

OBJECTIVE OF THE STUDY

Objective of the study

The overall objective of this study was to evaluate some cardiorespiratory fitness indexes of undergraduate students in Adekunle Ajasin University and compare them with established norms.

Research hypotheses

The following research hypotheses were tested:

- There was no significant difference between the heart rate of Undergraduate Students in Adekunle Ajasin University established norms
- There was no significant different between systolic blood pressure of Undergraduate Students in Adekunle Ajasin University and the established norms
- There was no significant different between diastolic blood pressure of Undergraduate Students in Adekunle Ajasin University and established norms
- There was no significant difference between VO_2 max of Undergraduate Students in Adekunle Ajasin University and the established norms

DEFINITION OF TERMS

Cardio-respiratory endurance

It is the ability of the body to perform prolonged, large-muscle, dynamic exercise at moderate to high levels of intensity.

VO_2 max

Is the maximum amount of oxygen consumed during physical work, expressed as millimeter of oxygen consumed per minute of maximum exercise per kilogram of bodyweight, ml/kg/min.

Physical fitness

The ability to carry out daily task with vigor and alertness without undue fatigue and with enough energy to enjoy one time pursuit and unforeseen circumstances and emergencies.

Blood pressure

Measure of the force that the circulating blood exerts on the walls of the main arteries. The pressure wave transmitted along the arteries with each heartbeat is easily felt as the pulse. The pressure caused by the heart pumping blood to all parts of the body is called blood pressure. This allows blood to circulate throughout the body. Normal BP is an indication of good health.

Heart rate

Number of times the heart beats per minute. The heart, like any other muscle, needs physical activity to keep it in good condition. In most cases regular exercise can help improve the overall heart health and help improve circulatory disease. It is important to know if exercising can help correct level of risk factor and measuring heart rate can help the level of fitness.

METHODS

Ex-post facto research design was adopted for the study. The population for this study comprised all Undergraduate Students in Adekunle Ajasin University Akungba Akoko, Ondo state, Nigeria. The sample for this study were 60 participants which comprised both male and female Undergraduate Students in Adekunle Ajasin University Akungba Akoko. Purposive sampling technique was adopted to evaluate 60 Undergraduate Students in Adekunle Ajasin University who volunteered for the study. The descriptive statistics of percentage, frequency, range, mean and standard

deviation were used to summarize the demographic data and answer research questions while inferential statistics of sampled t-test were used to test the hypotheses. Alpha level was set at 0.05 level of significance.

RESULTS

This chapter present the analysis of data collected in the study. The result of the finding are presented in this chapter in relation to the research questions postulated for the study.

Table 1 above revealed that all the faculty were equally represented 10 (16.7%) of all the faculty in Adekunle Ajasin University, Akungba-Akoko were sampled.

Table 1: Distribution table showing faculty of the respondentstion.

Faculty		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Education	10	16.7	16.7	16.7
	Science	10	16.7	16.7	33.3
	Arts	10	16.7	16.7	50
	Law	10	16.7	16.7	66.7
	SMS	10	16.7	16.7	83.3
	Agric	10	16.7	16.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

Table 2 above revealed gender distribution of the respondents, it was showed that 25 (41.7%) of the respondents were male while 35 (58.3%) were female. This showed that majority of the respondents were female.

Table 2: Distribution table showing gender of the respondents.

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	25	41.7	41.7	41.7
	Female	35	58.3	58.3	100
	Total	60	100	100	
Source: Field experiment, 2018					

Table 3 above revealed that 26 (43.3%) of the respondents were in age bracket 16-20 years of age, 30 (50.0%) were age range between 21-25 while 4 (6.7%) were age range between 26-30 years of age. This revealed that majority of the respondents were in age bracket 21-25 years of age.

Table 3: Distribution table showing respondents' age.

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	16-20	26	43.3	43.3	43.3
	21-25	30	50	50	93.3
	26-30	4	6.7	6.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

The table 4 revealed the level of the respondents. It was revealed that 12 (20.0%) of the respondents were in 100 level also 12 (20.0%) were in 200 level and 12 (20.0%) 300 level respectively, 11 (18.3%) of the respondents were in 400 level while 13 (21.7%) of the respondents while in 500 level.

Table 4: Distribution table showing Respondents' Level

Level		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	100	12	20	20	20
	200	12	20	20	40
	300	12	20	20	60
	400	11	18.3	18.3	78.3
	500	13	21.7	21.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

Research Question One: What is the basic physiological health status (heart rate, systolic blood pressure and diastolic blood pressure) of Undergraduate Students in Adekunle Ajasin University and established norms?

Table 5 revealed that 4 (6.7%) of the respondents were in resting heart range of 60-63, 7 (11.7%) were in resting range of 64-67 while 23 (38.3%) of the respondents were in resting heart range of 68-72, 9 (15.0%) of the respondents were in resting heart range of 73-77 and 17 (28.3%) of the respondents were in resting heart range of 78-82.

Table 5: Distribution table showing Resting Heart Rate of AAUA undergraduate student.

Resting		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	60-63	4	6.7	6.7	6.7
	64-67	7	11.7	11.7	18.3
	68-72	23	38.3	38.3	56.7
	73-77	9	15	15	71.7
	78-82	17	28.3	28.3	100
	Total	60	100	100	
Source: Field experiment, 2018					

Table 6 revealed that 21 (35.0%) of the respondents have systolic blood pressure range of 100-109, 26 (43.3%) were in systolic blood pressure of 110-119 and 13 (21.7%) of the respondents have systolic blood pressure range of 120-129.

Table 6: Distribution table showing Systolic Blood Pressure of AAUA undergraduate student.

Systolic Blood Pressure		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	100-109	21	35	35	35
	110-119	26	43.3	43.3	78.3
	120-129	13	21.7	21.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

Table 7 revealed that 10 (16.7%) of the respondents have diastolic blood pressure range of 50-59, 25 (41.7%) of the respondent diastolic blood pressure range of 60-69, 15 (25.0%) of the respondents have diastolic blood pressure range of 70-79 and 10 (16.7%) of the respondents have diastolic blood pressure range of 80-89.

Table 7: Distribution table showing Diastolic Blood Pressure of AAUA undergraduate student.

Diastolic Blood Pressure		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50-59	10	16.7	16.7	16.7
	60-69	25	41.7	41.7	58.3
	70-79	15	25	25	83.3
	80-89	10	16.7	16.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

Table 8 revealed that 10 (16.7%) of the respondents have VO_2 max × 1.5 miles walk/run test range of 12-14, 12 (20.0%) were in VO_2 max × 1.5 miles walk/run test range of 15-16 and 15 (25.0%) of the respondents have VO_2 max × 1.5 miles walk/run test range of 17-18, 19 (31.7%) of the respondents have Vo_2max × 1.5 miles walk/run test range and 4 (6.7%) of the respondents have Vo2max × 1.5 miles walk/run test range of 21-22.

Table 8: Distribution table showing Vo2Max 1.5miles walk/run test. of AAUA undergraduate student.

Vo2max × 1.5 miles walk/run test		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14-Dec	10	16.7	16.7	16.7
	15-16	12	20	20	36.7
	17-18	15	25	25	61.7
	19-20	19	31.7	31.7	93.3
	21-22	4	6.7	6.7	100
	Total	60	100	100	
Source: Field experiment, 2018					

Research hypotheses

Hypothesis 1

There is no significant difference between the heart rate of undergraduate students in Adekunle Ajasin University established norms.

Interpretation

Table 9 revealed that there a significant difference in the heart rate of student of AAUA with mean value of 3.47 and standard deviation value of 1.213 and norms of 1.00 and standard deviation of .0.00 with t-cal of 22.122 greater than table value of 1.98 which is significant at (0.000) at alpha level of 0.05. Therefore, the hypothesis which stated that there is no significant relationship between heart rate and norms of AAUA student is hereby rejected.

Table 9: t-test showing whether there is different between the heart rate of undergraduate students in Adekunle Ajasin University and established norms.

Variable	N	Mean	Std. Deviation	Std. Error Mean	df	t-cal	t-tab
Heart rate	60	3.47	1.213	0.157			
					58	22.122	0.198
Norms	60	1	0	0			
Norm Source Hockey 1993							

Hypothesis 2

There is no significant difference between the systolic blood pressure of undergraduate students in Adekunle Ajasin University established norms.

Interpretation

Table 10 revealed that there a significant difference in the systolic blood pressure of undergraduate student of AAUA with mean value of 1.87 and standard deviation value of 0.747 and norms of 1.00 and standard deviation of 0.00 with t-cal of 19.353 greater than table value of 1.98 which is significant at (0.000) at alpha level of 0.05. Therefore, the hypothesis which stated that there is no significant relationship between systolic blood pressure and norms of AAUA student is hereby rejected.

Table 10: t-test showing whether there is different between systolic blood pressure of undergraduate students in Adekunle Ajasin University and established norms.

Variable	N	Mean	Std. Deviation	Std. Error Mean	df	t-cal	t-tab
Systolic Blood Pressure	60	1.87	0.747	0.096			
Norms					58	19.353	0.198
	60	1	0	0			
Norm Source Hockey 1993							

Hypothesis 3

There is no significant difference between diastolic blood pressure of undergraduate students in Adekunle Ajasin University established norms.

Interpretation

Table 11 revealed that there a significant difference in the diastolic blood pressure of undergraduate student of AAUA with mean value of 2.41 and standard deviation value of 0.962 and norms of 1.00 and standard deviation of 0.00 with t-cal of 19.462 greater than table value of 1.98 which is significant at (0.000) at alpha level of 0.05. Therefore, the hypothesis which stated that there is no significant relationship between diastolic blood pressure and norms of AAUA student is hereby rejected.

Hypothesis 4

There is no significant difference between VO_2 max of undergraduate students in Adekunle Ajasin University

established norms.

Interpretation

Table 12 revealed that there a significant difference in the VO_2 max of undergraduate student of AAUA with mean value of 2.92 and standard deviation value of 1.211 and norms of 1.00 and standard deviation of .0.00 with t-cal of 18.65 greater than table value of 1.98 which is significant at (0.000) at alpha level of 0.05. Therefore, the hypothesis which stated that there is no significant relationship between VO_2 max and norms of AAUA student is hereby rejected.

DISCUSSION

From research question one, it was revealed that respondents resting heart rate of AAUA undergraduate student with mean value of 3.47 and standard deviation value of 1.213. This was in line with findings of Zavorsky (2000) [19,20]. Who affirmed that the American College Sport Medicine recommends aerobic exercise per week for 20 minutes-60 minutes per session, at an intensity that maintains the heart rate between 60%-90% of the maximum heart rate.

It was also revealed from the results that systolic blood pressure of AAUA undergraduate students with mean value of 1.87 and standard deviation value of 0.747. This was also in line with the assertion of Kannel, 1999, 2000; Lloyd-Jones et al., 1999 with mean value of 2.02 and standard deviation value of 1.603 who agreed that both SBP and DBP should be used to classify hypertension, prospective observational studies have provided data on whether, over the long term, there appears to be an association between blood pressure and disease end-points [21]. Therefore, comparisons of the strength of associations for both DBP and SBP may be made.

From the findings, it was revealed that VO_2 Max 1.5 miles walk/run test of AAUA undergraduate students with mean value of 2.92 and standard deviation value of 0.156 [22-28], who affirmed that the mean value of 71.91 and standard deviation value of 6.87. The VO_2 max test provides important information on the capacity of the long-term human energy system. This measurement has significant physiologic meaning in that attaining a high VO_2 max requires a high level of respiratory, cardiovascular, and neuromuscular functions. Therefore, VO_2 max is an important measurement of fitness for athletes and coaches. It has been established that VO_2 max is more highly correlated with performance than is muscle fiber composition or skeletal muscle enzyme activity [29-34].

CONCLUSION

Based on the findings in the study, the study concluded that:

1. There is no significant relationship between heart rate and norms of AAUA student
2. There is no significant relationship between systolic blood pressure and norms of AAUA student
3. There is no significant relationship between diastolic blood pressure and norms of AAUA student
4. There is no significant relationship between VO_2 max and norms of AAUA student

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

1. University management should make physical activities compulsory for students regardless of their level.
2. The State Government should organize seminars/workshop to sensitize the general public on the need to engage in physical fitness exercise.
3. Adekunle Ajasin University students should make physical fitness exercise a priority.
4. School management must ensure that there must be a special facilities for physical exercises in the university.

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