IMPACT OF FOX EQUATION ON MAXIMUM OXYGEN INTAKE (VO_2 MAX) OF STUDENTS DURING RECOVERY AFTER EXERCISE

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Abstract
This studyinvestigated the maximum oxygen consumption of students of the Human Kinetics and Health Education Department, University of Port Harcourt, using the equation (VO_2 Max = 6.3- 00.193 ×HR sub). It went on to compare the values of male and female and the relationship of VO_2 max to anthropometric measurement. The Harvard step test was used and the subject was required to perform for a period of two months. Seven males and seven females were used for the study. Most of the students were found to have low VO2 max levels while there was no significant difference between the scores for the males and females. Based on these, the Human Kinetic Department was advice to place athletes under the sane level of training as far as workload is concerned.

Keywords: Impact, Fox Equation, Maximum Oxygen, Step Test, Exercise

Introduction

The central component of physical activities is that it implies to large muscle (body) movement, intensity, duration and frequency are attributes used to characterize physical activity (Ogunleye & Onuoha, 2017). While other attributes such as the setting for physical activity, describe the context in which the activity occurs. The diverse setting for physical activity include household and domestics physical activity including vigorous housework and gardening, which may confer some health benefits (Ogunleye & Nwadibia, 2018).

Some specific anthropometrics measurements are necessary for athletic performance (Agbojinmi, 1995). It is common practices among athletic than their male to give lesser workloads to female athletes than their same counterparts despite the fact that they engage in the same event.

Oduyale (1998) has shown that thigh muscle girth was found to correlate positively with VO_2 Max (Ajiduah, 1996; Agbojinmi and Amusa 1995) and leg mechanical power in standing broad jump performance. Oduyale 1998 again stated that training workloads are also accompanied by longer recovery periods due to physiological status.

On the other hand, coaches may have knowledge of physiological principles and

physical differences in both sexes; a fundamental principles similar physiological response in different sexes.

The previous researches conducted to determine the physical structure in relation to performance proved that individual constituted no decisive bearing on performance in given a field of sport (Agbojinmi, 1995). While Igbanigo (2006) said the capacity of an individual to perform his normal daily tasks without undue fatigue and with enough strength energy left over to satisfactorily meet with any emergency situation that calls for physical exertion. Emiola (2007) sees Fox equation in determining components of physical fitness. He explained that the components of physical fitness can be grouped into two, health-related components of physical fitness and skill-related components of physical fitness.

This study would update the already established knowledge stated above and look at the application of fox equation to determine physiological response in the recovery heart rate and VO_2 to determine physical fitness status through physiological parameters.

The purpose of this study was to ascertain the use of fox equation to determine the maximum oxygen intake (VO_2 max) of Physical and Health Education student of University of Port Harcourt, during the recovery period after exercise.

Hypotheses

1. There is no significant different in the resting pulse rate of both male and female subjects.
2. There is no significant different in the recovery pulse rate of both male and female subjects.
3. There is no significant different in maximum oxygen consumption (VO_2 max) of both male and female subject.
4. There is no correlation between maximum oxygen consumption (VO_2 max) and anthropometric measurement.

Methodology

The fourteen subjects (seven males and females) used in this study were all Human Kinetic and Health Education students of University of Port Harcourt. They were randomly chosen and the consent of the Head of Department was sought for the use of the students and the gymnasium. All the subjects were informed about the nature of the test in which they will be required to participate. Informed consent was secured from all of them after the test protocol has been explained. The research design adopted was the

experimental research design that was for the study.

On arrival for the test, each subject was made to settle down for body measurement and that of pre-test (resting) pulse rate. The pulse rate was obtained by simple palpation of the radial artery at the wrist of the right hand. This was taken for one minute.

Two branches, fifty centimeters (50cm) and fifty-eight centimeters (58cm) were provided for the Harvard step test for both female and males respectively.

Each of the subjects was made to step up and down the bench continuously for a period of two minutes. At the expiration of the exercise period, the pulse rate was immediately taken for the recovery period. The pulse rate was monitored by the investigators while the recording was going on. The test was administered between the hours of 6.00am-8.00am to avoid any other physical education (practical) class.

The correlation coefficient was used to determine the relationships between the anthropometric measurement taken and the recovery heart rate of both males and females. The mean and standard deviation of the recorded pulse rate were obtained for two groups of subject.

The t-test was used to compare the means obtained for two groups in order to determine whether there would be any significant difference in pulse rate of the male and female subject before and after exercise session.

Discussion

A close study of table 1 shows that there were differences in the recorded values of the body measurement obtained for both male and female subjects. The mean score for male is 134.2 and standard deviation of 11.6 while the score of female is 136.5 and the standard deviation of 11.7 the differences between these values are statistically significant.

Table 1: body measurement of male and female HKE students

MALES				**FEMALES**		
S/N	NTG	MTG	CALF	UTG	MTG	CALF
1	54	53	32	49	48	36
2	53	47	30	52	53	35
3	52	52	34	50	50	35
4	47	46	31	51	47	34
5	48	47	30	56	56	36
6	56	57	37	54	52	36
7	51	51	34	46	48	34

	MALES	FEMALES
Mean	134.2	136.6
Std. Deviation	11.6	11.7

Keys

UTG – Upper Thigh Girth

MTG – Middle Thigh Girth

Table 2 shows the rest and recovery pulse with their means and standard deviations. It showed that few of the subjects resting rates came close to mean resting rates, which were84.5 and 75.4 respectively. When compared to the mean recovery pulse rate 101.2 for males and 59.8 for females, it was discovered that there is much significance difference. The standard deviations for the two groups are 10.1 for the males and 7.8 for the females.

Table 2: Rest and Recovery Pulse Rate of Subjects

MALES			**FEMALES**	
S/N	RHR	RCHR	RHE	RCHR
1	82	114	76	68
2	94	65	60	58
3	64	126	70	52
4	86	94	84	62
5	90	134	76	56
6	74	162	72	60
7	100	78	90	62
TOTAL	592	708	528	418
X	84.5	101.14	75.4	59.71
SD	9.19	10.05	8.68	7.72

Key

RHR – Resting Heart Rate

RHR – Recovery Heart Rate

X - Mean

SD - Standard Deviation

Table 3: Predicted Maximum Oxygen Intake (Vo_2 Max) of the Male and Female Subjects with the Use of Fox Equation

S/N	VO_2 MAX (MALE)	VO_2 MAX (FEMALE)
1	4.099U/min	4.987U/min
2	5.026	5.180U/min
3	3.868	5.290
4	4.485	5.103
5	3.713	5.219
6	3.173	5.142
7	4.794	5.103
TOTAL	29.165	36.021
X	4.165	5.146
SD	2.04	2.27

Table 3 shows that the mean for males was 4.17 and the standard deviation of 2.04 while the female have a mean VO_2 max score of 5.14 and standard deviation of 2.27. Thedifference between these values are statistically significant.

Table 4 and 5 indicated the relationship between the variables and their t-score to ascertain if there are any significant difference. The body measurement in relations to VO_2 max has a value of 0.016.

Result of t-test indicated that there is only a slight difference between male and female subject.

Table 4: Correlation and Variables Measured in both Male and Female Subject

VARIABLES COMPARED	PPMC	INTERPRETATION
Body measurement male /female	0.90	Highly positive
Body measurement/VO_2 max (Male)	0.68	Slightly positive
Body measurement/VO_2 max (Female)	0.66	Slightly positive

In the correlation of both male and female subjects, it was indicated that body measurement of male and female was 0.96 showing a high level of correction when compared to VO_2 max of male and female with 0.68 and 0.66 indicating slightly positive correlation as an indices of determining their level of fitness.

Table 5: t-test values of all variables Measured in both Males and Females

	MALE					
VARIABLE	**X**	**SD**	**t-test**	**X**	**SD**	**t-test**
	134.2	11.6	11.5	136.5	11.7	11.7
	84.5	9.2	9.1	75.4	8.7	8.6
	101.2	10.1	10	59.8	7.8	7.6
	4.16	2.1	2.03	5.15	2.3	2.2

In comparing the mean recovery heart rates of the male and female subject, the male recorded a relatively higher values at the time space of two minutes compared to oduyale's (1988) findings of females scoring higher. The result however does not show much difference between the recovery pulse rate and the resting pulse rate of all the subjects.

VO_2 max has often been used as a determinant of one's level of physical fitness (Chado,1990) and has been used by coaches and athletic trainers over the years (Ayodabo,1990).

In their study on VO_2 max in both male and female subjects, Astrand (1960), Oduyale (1988), Ayodabo (1990) and Agbojinmi (1995) concluded that both male and female athletes could be placed under the training conditions because previous studies had shown only slight differences.

Oduyale (1988) and Kaplan (1988) found that resting heart rate in adult females averages about ten beats faster than their male counterparts under any given set of conditions. High altitude study done by Hannon (1996) comparing male and female acclimatization process indicated that few weeks of exposure, the female subjects exhausted a slightly grater trachycardia than the males of any given period of exposure. In this study, the reverse is the case as result obtained on the subject on their VO_2 max was slightly positive. Amusa and Igbanugo (1990) produced similar physiological responses. This principle highly buttressed the study compared to Oduyale's (1988) study as they all exhibited the same pattern of recovery after exercise. Further explained, a smaller heart would need grater efforts to pumps out blood, more so when it is given a very exerting work to do. Thus, in order to meet up with the demand of the body's tissues for nutrients and oxygen, it needs to be faster.

Conclusion

From this study, the following conclusions could be drawn:

The physiological response in terms of pulse rate of both groups of subjects to exercise is similar. As a result, a well-

trained female athlete can withstand the same level of stress with her trained male counterpart.

The maximum oxygen consumption of most of the subjects was also found to be below values given by Chado (1990). This could be due to the fact that students have just returned from break and might not have had active lives while on break.

Recommendations

This study found out that 55 percent of students had loss level of VO_2 max in comparison to standard measures as compared to Chado (1990). To improve on this therefore, the KHE Department is advised to give the students enough aerobic exercise during practical lessons, which could help improve their situation. Even though there are slight differences in VO_2 max between male and female subjects, it is advisable that coaches and trainers place both male and female athlete under the same training condition for maximum training effects.

In the choice of athletes for event that require a good state of fitness, anthropometric measurement should be taken into consideration since they have found to relate positively to VO_2 max. This will go a long way in improving their performances.

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