Effects of Aerobic Exercise on Some Hematological Parameters in Healthy Athletic Subjects in Umuahia

Maureen Njideka Nwokocha*

[1]*Department of Data Science & Cyber Security Texas A&M, Commerce, Dallas; E-mail: Maureennjef@yahoo.com*

Abstracts: There is an accord that exercise induces changes in hematological parameters. But there are conflicting findings on the direction of those changes. The aim of this study is to highlight the consequences of aerobics on some hematological parameters in healthy athletic subjects in Umuahia. It focuses on how to determine the effect of aerobic exercise on some hematological parameters such as, white blood cell, red blood cell, neutrophil, lymphocyte, platelet etc. The subjects consist of 10 males and 1 female healthy athlete. Subjects were selected after they were informed of the experimental details and the participants gave their consent to participate in the study. The result of the analysis showed that the effect of aerobic exercise on some hematological parameters increases after the exercise in most of the hematological parameters except for mean corpuscular hemoglobin that decreases after a moderate aerobic exercise.

Keywords: Exercise, Aerobic, Athletes, Hematological Parameters, Blood Pressure, Cardio.

1. INTRODUCTION

With the event of cardiovascular activities performed in the body, and the changes in body composition and blood pressure, regular exercise will make the human body create additional resistant to stress and diseases conditions (Uz,2011). Exercise immunologists have recognized for many years that associate degree excessive quantity of either acute physical activity or intensive coaching is prejudicial to immunologic conditions.

Frequent and regular work up is known to spice up the immune system and should facilitate forestall "diseases of affluence" like cardiovascular disease, type 2 diabetes, and obesity (Eledo *et al*., 2017). However, its implementation and intensity ought to be, so its aspects effect area unit reduced (Purohit *et al.,* 2013). Aerobic exercise (which can also be referred to as cardio) is a workup of low to high intensity that depends totally on the aerobic energy-generating method. Samples of aerobic exercise embrace cycling, rowing, running, brisk walking, hiking, swimming, court game, skipping rope, continuous training, and long slow distance training (William *et al.,* 2016).

The body system will react against this stress by displaying some changes in metabolic, hormonal and immune system. One amongst these changes is the changes in hematological parameters. Additionally, it has been shown that changes in blood volume is a crucial adaptation to exercise coaching (Hu and Lin 2012). The foremost vital impact of standard exercise is on blood chemistry betting on the exercise.

1.1. Importance Of Exercise

The following are importance of exercise in my study.

- Decreases body fat.
- Improve sense of wellbeing.
- Decrease bone mineralization.
- Improves oxygen delivery and metabolic process.

- Helps keep blood flow level normal.
- Muscle strengthening.

1.2. Problem Statement

There is an accord that exercise induces changes in hematological parameters. But there are conflicting findings on the direction of those changes. For instance, Mairbaul et al. (2013) found a decrease in hemoglobin and hematocrit values. Also, Muaz et al. reported a rise within the range of leukocytes (Muaz *et al.,* 2017) whereas, Ramos-Campo et al. (2016) reported a discount within the absolute lymphocyte count and a rise in neutrophils and monocytes count.

With the on top researchers' work being revealed with completely different results, it is obvious that there is a tangle that must be perceived and researched on to get the exact effects of aerobic exercise. Therefore, my area of research (Umuahia, in Abia State, Nigeria) was chosen due to availability of athletes in that area.

1.3. Aims of the Study

Exercise makes one match, healthy and free from diseases. The supply of blood vessels to the heart can improve function of the heart and possible heart diseases.

The aim of this study is to highlight the consequences of aerobics on some hematological parameters in healthy athletic subjects in Umuahia. The result of the analysis can offer trainers and athletes with helpful information regarding the consequences of aerobic exercise.

1.4. Objectives

This research focuses on how to determine the effect of aerobic exercise on some hematological parameters such as, white blood cell, red blood cell, neutrophil, lymphocyte, platelet etc.

Some specific objectives are:

- To highlight the importance of exercise on cardiovascular
- To explore how diastolic and systolic blood pressure changes before and after exercise

1.5. Research Questions

The research questions for this study are:

- What are the effects of exercise on athletes?
- What are the effects of aerobic exercise on blood parameters and coronary artery disease?
- What are the significant changes in the parameters?

2. LITERATURE REVIEW

2.1. Exercise

Exercise is outlined as any situation using the skeletal muscles, regardless of the aim, in the middle of a rise in energy expenditure compared with the resting state (Nocon *et al.,* 2018). It always includes each activity of daily living, time off and recreational physical activity.

The term ‘exercise’ is more specifically employed in order to explain physical activity that is planned, structure and repetitive, that is performed to keep up or improve health and fitness.

Exercise is any bodily activity that enhances or maintains good shape, overall health and wellness. Regular exercise may additionally facilitate stop stress and depression, increase quality of sleep and act as a non-pharmaceutical sleep aid to treat diseases such as sleep disorder, improve mental state, maintain steady digestion, and treat constipation and gas, regulate fertility health and augment an individual’s sex appeal or body image and physical exercise could facilitate decrease in the consequences of childhood and adult fat (Pimlott.,2010).

2.2. Classification of Exercise

Exercises are generally classified into three sorts depending on the effects they need on physical structure.

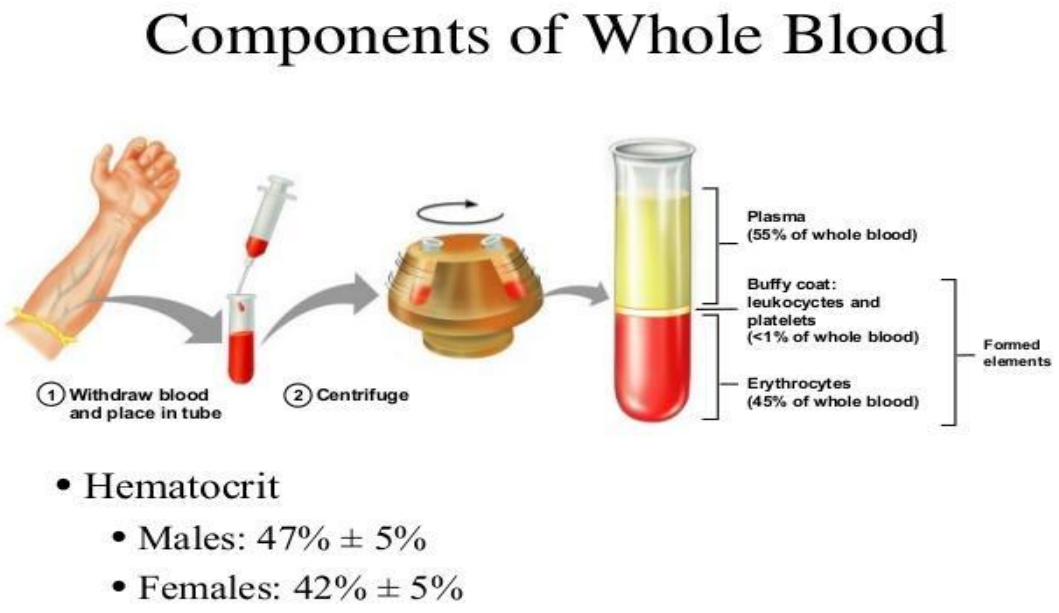
- Aerobic exercise
- Anaerobic exercise
- Flexibility exercises

This study specializes on aerobics that is additionally referred to as cardio, which it is a physical exercise of low to high intensity that depends totally on the aerobic energy generating method.

3. HEMATOLOGICAL PARAMETERS

Blood could be circulating fluid providing the body with nutrition, oxygen, and waste removal. Blood is generally liquid with various cells and proteins suspended in it, making blood “thicker” than pure water. The common person has about 5 liters of blood. Blood accounts for 7% of the anatomy weight, with a median density of roughly 1060kg/m, terribly on point of pure water’s density of 1000 kg/m (Alberts and Bruce, 2012). The common adult encompasses a blood volume of roughly 5 liters, that consists of plasma and several other sort of cells. These blood cells (which are also called corpuscles or formed elements) consists of erythrocytes (red blood cells, RBCs), leukocytes (white blood cells), and thrombocytes. By volume, the red blood cells represent about 45% of whole blood, the plasma regarding 54.3%, and white cells regarding 0.7% (Elert *et al.,* 2012).

While blood (plasma and cells) exhibits non-Newtonian fluid dynamics if all human hemoglobin were free within the plasma rather than being contained in RBCs, the circulatory fluid would be too viscous for the cardiovascular system to operate effectively.



The diagram above showed the types of blood compartment.

4. MATERIALS AND METHODS

4.1. Materials

- 1 female
- 10 males
- 5ml syringe
- Stopwatch
- Tourniquet
- Heparinized bottle
- Methylated spirit
- Surgical glove
- Permanent market
- Anthropometric questionnaire
- Meter rule
- Weighing scale
- Digital sphygmomanometer

- Cotton wool
- Plaster

4.2. Methods

The subject consists of 10 males and 1 female healthy athlete. Subjects were selected after they were informed of the experimental details and the participants gave their consent to participate in the study. Only subjects who meet the criteria in the below table were admitted into the study.

Selection criteria

i.	Age range 17-25 years
ii.	Not Obese
iii.	Height range between 162cm-172cm
iv.	Weight range between 55kg-72kg
v.	Healthy athlete
vi.	Fast before the exercise (Not allowed to eat before the exercise)

4.3. Exercise protocol

This research was supported by friends, (the subjects) who are athletes at Umuahia stadium for Umuahia State Athletics Association, Abia State, Nigeria. They were told not to eat on the day in which the activity was carried out and the activity was divided into two phases which are Before exercise and After exercise.

Before exercise, the subjects were told to rest for 10 minutes and subsequent to this resting, their anthropometric data (age, sex, height and weight) was recorded and their cardiovascular indices such as, systolic blood pressure, diastolic blood pressure and heart rate were measured by digital sphygmomanometer and blood wascollected from the subjects immediately after the measurement of the cardiovascular indices by using 5ml syringe to take the blood, minimum of 2.5ml and maximum of 4.5ml, methylated spirit was applied to the surface to clean the surface before taking the blood. Heparinized bottle was used to collect the blood samples to prevent it from clotting. A moderate exercise (jogging) is done by the subjects on the field track for 20 minutes and the after-exercise phase proceeded immediately after the exercise.

After the exercise, the subjects sat down, their cardiovascular indices were measured again, and their blood too were collected in the same way it was done in the before exercise phase.

The sample was then taken to a hematological laboratory for auto analyzing the parameters needed such as white blood cells count, red blood cells count, hematocrit etc.

5. STATISTICAL ANALYSIS

The mean values (+SEM) are recorded in this study. Statistical comparison was made using student's paired t-test. The statistical significance was accepted at $P<0.05$.

5.1. Results

White blood cell

In this study, it was observed that there is a significant increase in the mean value of white blood cell from 5072.73≠321.39 to 6072.73≠450.47 cu mm. The change in the white blood cell count was 1000≠326.63 cu mm, $p<0.05$, $n=11$.

5.2. Hematocrit

All the subjects showed an increase in their hematocrit count after the exercise. The overall mean values increase from 43.48≠1.19 to 44.78≠1%. There was a significant change, and the change was 1.3≠0.36%, $p<0.05$, n=11.

5.3. Red Blood Cell

The mean value of red blood cell count after the exercise increases from 5.3455≠0.137 to 5.4236×10^6 ±0.149 cu mm. The change in their mean value was 0.078×10^6 ±0.0488. $p>0.05$, n=11.

5.4. Neutrophil

All the subjects showed a significant rise in the mean value of neutrophil count from 2627.27 ± 379.50 to 3027.27 ± 403.42 cu mm. $p<0.05$, n=11.

5.5. Procalcitonin

There was a significant increase in the subjects procalcitonin count after exercise from 0.232 ± 0.021 to $0.27 \pm 0.019\%$. The change in their mean was $0.038 \pm 0.0065\%, p < 0.05, n = 11.$

5.6. Platelet

All the subject showed a significant increase in the mean value of platelet count from 198727.27±28455.10% to 227181.82±29483.38%. The change in the mean value was 28454.55±10030.28%, $p<0.05$, n=11.

5.7. Lymphocyte

There was a significant increase in the mean value of lymphocyte from 1900±171.09 to 2463.64±226.95 cu mm. The difference in the mean value was 563.64±166.39%, $p<0.05$, n=11.

5.8. Mean corpuscular hemoglobin count.

There was no significant change in the mean corpuscular hemoglobin value from 35.04±0.27% to 35.27±0.27%. The change was 0.24±0.14%, $p<0.05$, n=11.

6. DISCUSSION

In this study, the changes in blood hematological parameters following aerobic exercise were studied and the effects on hematologic parameters was investigated. After the study, most of the hematological parameters inflated after the aerobics, within which a number of the findings are in consonance with a previous study. (Lippi et al., 2014)

Hematological changes are related to physical activity (exercise) and these changes are found to involve leucocytes, red blood cells and thrombocytes (Al-Taee N *et al.*, 2017). It has been discovered that aside the intensity, length and kind of exercise, different factors like gender, coaching standing, age, nutritional status of subjects and environmental conditions play a vital role within the exercise-induced hematological changes.

In the present study, after aerobic exercise, a big reduction in Mean corpuscular hemoglobin count value was observed compared with the level before the exercise.

In this analysis, it was discovered that after the exercise, red blood cell values after aerobic exercise became higher compared to the values before the exercise. These increases were reported to be obsessed on plasma loss

caused by exercise (Londeann 1978). This study is in consonance with some previous studies. One of the studies discovered that there was a rise in red blood cell levels after aerobic exercise and that erythrocyte levels of participants showed meaningful increase after a moderate run/jogging compared to the extent before the run.

In this study, hematocrit was measured before and after the exercise. It was observed that hematocrit measured after the exercise inflated compared to those before the exercise. This result is in consonance with a previous study (Lippi *et al.,* 2014)

Neutrophil count was measured before and after the exercise and that they were compared. It was absolutely discovered that compared with those before the exercise, neutrophil increase significantly after exercising and there was an increase chemotaxis of phagocytic cells because neutrophil count is elevated immediately after exercise.

In this study, leukocytic parameters like, white blood cell, lymphocyte and procalcitonin count were measured before and after the aerobic exercise. It was discovered that after the exercise, there was a rise within the values of the worth of the above parameters. This study is in consonance with a previous study (Lippi *et al.,* 2014).

It was observed in the study that there were notable increases in the level of platelet after aerobic exercise. Also, this study is in consonance with a previous a study (Lippi *et al.,* 2014).

CONCLUSION

It can therefore be concluded that the effect of aerobic exercise on some hematological parameters increases after the exercise in most of the hematological parameters except for mean corpuscular hemoglobin that decreases after a moderate aerobic exercise.

Time Frame: February-June 2021

February	Research Title Selection
March	Searching for a Location and meeting with the sport committee
April	Exercise protocol, Data collection and analysis
May	Literature Review
June	Presentation

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