Science Journal of Clinical Medicine
2016; 5(4): 32-40
http://www.sciencepublishinggroup.com/j/sjcm
doi: 10.11648/j.sjcm.20160504.11
ISSN: 2327-2724 (Print); ISSN: 2327-2732 (Online)

Intervention of Floor Aerobics Exercise on Hematological Characteristics of People Living with HIV/AIDS, the Case of Yetessfa Bisrat Miskir Association, Dire Dawa, Ethiopia

Yenehun Taye

Department of Sport Science, College of Natural and Computational Sciences, Dire-Dawa University, Dire-Dawa, Ethiopia

Email address:
yenehun2003@gmail.com

To cite this article:
Yenehun Taye. Intervention of Floor Aerobics Exercise on Hematological Characteristics of People Living with HIV/AIDS, the Case of Yetessfa Bisrat Miskir Association, Dire Dawa, Ethiopia. *Science Journal of Clinical Medicine.* Vol. 5, No. 4, 2016, pp. 32-40.
doi: 10.11648/j.sjcm.20160504.11

Received: July 19, 2016; **Accepted**: August 5, 2016; **Published**: September 13, 2016

Abstract: There is much scientific evidence that indicates that physical exercise training is not only appropriate but also warranted for patients with HIV/AIDS. This was study carried out to identify the Intervention of floor aerobic exercise on hematological characteristics of people living with HIV/AIDS Anti Retroviral Therapy (ART) users. A convenience sample of 52 subjects (26 male and 26 female participants) between the age of 30 and 50 years (mean 38.6) were participated with a minimum of 28 and maximum 36 sessions. The study aimed to compare of the results before and after exercise of the study subjects and also with respect to sex difference. The results were assessed one pre exercise test and three post exercise tests for three continuous months. T-test analysis was used to test significant differences between Pre Exercise Test Result (PETR) and Post Exercise Test Result (POETR) of components of hematological results. The mean comparison of hematological count of PETR compared with POETR within them and in terms of sex difference has shown that significantly difference at the probability level of 5%. The higher mean value of WBC, MCV, MCH and MCHC obtained by females and the remaining hematological parameters highest mean value of RBC, HGB, HCT, RDW, PCT, PLT, MPV, PCT and PDW obtained by males at PEOTR with compared to PETR value. These findings suggest that increasing duration, frequency, modality and intensity of floor aerobics exercise might have beneficial effects on immunity induction in people with HIV/AIDS.

Keywords: Floor Aerobic Exercise, Hematology Characteristics, HIV/AIDS

1. Introduction

There is much scientific evidence that indicates that physical exercise training is not only appropriate but also warranted for patients with HIV/AIDS. Results from various meta analyses suggest that constant or interval aerobic exercise at 60–80% of maximum HR, or a combination of aerobic exercise and progressive resistance exercise for at least 20 minutes, three times a week for a minimum period of four weeks is beneficial and appears to be safe for adults living with HIV/ AIDS [1]. Aerobics exercise has been used successfully in the treatment of diabetes [2] cardiovascular disease [3]. The benefits of regular exercise also extend to the population infected with HIV. Chronic HIV infection is associated with muscle wasting, muscle weakness, fatigue, impaired functional work capacity, depression, and decreased quality of life, which lead to disability and mortality. Exercise can positively affect many aspects of the physical and mental health of HIV-infected patients. HIV/AIDS poses serious risks to the health of millions around the globe. Despite decades of research, no cure or vaccine has been found to prevent this disease and the resultant morbidity and mortality. Therapies, such as steroid and growth hormone administration, are also effective in treating HIV related symptoms, but with serious side effects and increased cost [4]. The most commonly used of which is therapeutic exercise, are currently being explored to deal with symptoms and complications of chronic HIV infection without the unwanted side effects [5].

In the global rank, Ethiopia has the 5th largest number of people living with the virus. The epidemic started from a low base in the 1980s which spread rapidly in the 1990s and

already an estimated 1.5 million Ethiopian adults and 250,000 children are living with the virus about 90% of the reported AIDS cases were between the age of 20 and 49, the most important ages from the economic and social points of view [6]. In 2011, adult HIV/AIDS prevalence in Ethiopia was estimated at 1.5 percent. From the total population of 84.3 million, approximately 1.2 million Ethiopians were living with HIV/AIDS in 2010 [7]. National models of HIV prevalence showed the incidence of HIV infection declined by over 25 percent between 2001 and 2009 [8].

Previous reports have suggested that there is an increased risk of anemia with more advanced HIV infection and over 80% of people with an AIDS diagnosis had some degree of anemia. People at more advanced HIV disease, or a lower CD4 count, had higher rates of anemia [8]. The present study was conducted to assess the hematological changes in HIV infected patients presenting to teaching hospital in pun jab. The results demonstrated that anemia occurs with increasing frequency during the early stages of HIV-1 infection. Whether this acute infection associated anemia will resolve during the typically latent period prior to clinical AIDS remains to be seen. Further-more, whether the presence or severity of anemia during acute HIV-1 infection will predict anemia in chronic infection and/or more rapid disease progression also remains to be seen. Given the results of other studies that have found anemia at any point in HIV infection is to be an independent risk factor for decreased survival. HIV disease progression is about five times more common in people with anemia. Anemia is also linked to a higher risk of death. [9] In established HIV infection, lower hemoglobin levels have been shown to correlate with decreasing CD4+ cell count and multiple studies have found an association between anemia during established infection and a faster progression to AIDS and death [10]. More-over, with anemia often suffer decreased quality of life as well as increased chance of mortality. A large study with enrolment of more than 1,200 HIV and cancer subjects showed that low hemoglobin levels are associated with greater fatigue and a poor overall quality of life. The CDC conducted a large study reviewing medical records of HIV-infected patients and found that the incidence of anemia was found to be strongly associated with progression of HIV disease [11]. A study noted [12] that the most frequent form of anemia in AIDS had the characteristics of anemia of chronic disease. The mean hemoglobin levels of patients with AIDS were reported to be between 9 and 10 gm/dL.

Many observations have shown that blood composition changes as a result of exercise. Szygula *et al* concluded that physical exercises, totally facilitate increased physical work and Increased peak of oxygen consumption, cause a series of changes in the body including in erythrocyte system of peripheral blood [13] Platelets (Thrombocytes) are small circular or oval plates with a diameter of 1 to 4 micro meters. Platelets are originated from extremely large cells belonging to hematopoietic cells in the bone marrow called "Megakaryocytic". Megakaryocytic are fragmented and become platelets either in the bone marrow or immediately after entering the blood. Immune system is one of critical systems that its proper function ensures the health of individuals. If this system fails to act correctly, survival would be impossible, because our body is constantly exposed to the invasion of bacteria, viruses, fungi, and parasites and all these agents exist even in normal circumstances [14]. The number of circulation of white blood cells and platelets by dynamic physical activities in humans can rapidly increase [15]. However, debates on the effects of exercise on hematological parameters still continue. While some studies indicate an increase in hematological parameters after intensive training exercise, some other studies show that hematological parameters after exercise did not change significantly, especially in trained athletes [16]. Since most studies on the effects of physical activity on blood serum parameters have yielded conflicting results and little research is available about the effects of resistance training on hematological parameters, the question raises that how circuit resistance trainings affect hematological parameters such as Platelet (PLT), Platelet Distribution Width (PDW), Mean Platelet Volume (MPV), Platelet-Large Cell Rate (P-LCR), White Blood Cell count (WBC), Lymphocyte percent (LYM), Neutrophil percent (NEUT), Mixed Cell percent (MXD), Red Blood Cell count (RBC), Red Distribution Width (RDW), Hemoglobin (Hb), Hematocrit (Hct), Mean Corpuscular Volume (MCV), and Mean Corpuscular Hemoglobin (MCH). Thus, this study was designed to meet the following objectives.

1.1. Objectives

1.1.1. General Objective

The aim of this study was to investigate the intervention of floor aerobics exercise on hematological characteristics of people living with HIV /AIDS at Dire Dawa City Administration.

1.1.2. Specific Objectives

- To evaluate the intervention of floor aerobics exercise on hematological characteristics before and after exercising.
- To compare the effect of floor aerobics exercise on sex difference hematological characteristics.

1.2. Limitation of the Study

To conduct this study the researcher was challenged by the willingness of the study participants regarding to their way of life during the actual data collection through exercise intervention because it was affected the progress of the study.

2. Materials and Methods

2.1. Description of the Study Area and Study Period

The floor aerobics exercise training program was held at Medhanialem Primary & Secondary School training hall and the laboratory was conducted at DCRH Dire Dawa City Administration (DDCA), Eastern Ethiopia. The DDCA is

located in the eastern part of Ethiopia. The administration is bordered by the Shinile Zone of the Somali National Regional State on the northwest, and northeast, and by the eastern Hararghie Region of the Oromia National Regional State on the south, southeast, and east. The city covers 11,732.6 msq and lies in the Dechatu River, at the foot of a ring of cliffs that has been described as "somewhat like a cluster of tea-leaves in the bottom of a slop-basin with a latitude and longitude of 9°36′N 41°52′E of meridian; and located 515 km from Addis Ababa. The climatic condition of the DDCA region seems to be greatly influenced by its topography, which lies between 950 – 1250m above sea level, and which is characterized by warm and dry climate with a relatively low level of precipitation. The mean annual temperature of the city is about 25.04°C. The average maximum temperature of the Administration is 31.40°C, while its average minimum temperature is about 18.36°C. The aggregate average annual rainfall that the region gets from these two seasons (March to April and August to September) is about 604 mm (Dire Dawa Administration document, 2011)

2.2. Study Design

Quantitative interventional study design was used to supplement the result of laboratory test.

2.3. Source of Sample Population

Among ART users from YBMA 52 voluntary members was participated in this study. The association, 376 females and 254 males, a total of 630 victims as members with the only criterion being attending ART program. Members have the following advantages: to activate the right donation for the right person, for job opportunity, to deliver house to house voluntary service to others by 85 members of the association and participate in different training programs.

2.4. Inclusion and Exclusion Criteria

Based on the following inclusion criterion study subjects were selected; subjects were living with HIV /AIDS and had no opportunistic diseases the last three months before the exercise training started and have taken antiretroviral drugs and voluntary to give 5cc blood sample once a month for three consecutive months. In addition, they had not been regularly exercising for at least six months prior to the beginning of the exercise training program. On the other hand, based on medical evidence and personal information of the subject that was unable to move, having opportunistic diseases and taking other drugs were not included in the study sample.

2.5. Sampling Method and Sample Size Determination Technique

Purposive sampling method was used due to the nature of the study and to keep the willingness of the study subjects to be included in the sample. Among ART users from YBMA, 52 study participants were selected with the use of their full willingness for the study purpose and recruited until the required sample size reached.

2.6. Source of Data

The primary data generated from laboratory results.

2.7. Materials and Procedures of Data Collection

Data collection performed using quantitative techniques to explore factors that are not addressed via a qualitative survey. Based on the statistical data from field experiment and laboratory tests determine the effect of floor aerobic exercise on immunity induction of people living with HIV/AIDS. The data collected from ART drug users from YBMA at DDCA. Qualified laboratory technicians, who had previous experience in sample collection and sample analysis process in related studies, participated as data collectors. They organized and facilitated the self- administrated sample collection and analysis process. The sample collectors collected blood samples, and analyzed immunological results from a given blood sample. Before collection of blood samples, the experimental group oriented and two cc of fresh blood sample collected from each study subject only one time on the same day of enrolment. Syringe, needle (vacationer holder), test tube, and gloves, cotton, alcohol (70%), bed regent, facs flow regent (20 litter), thermal paper, A4 paper, pen, safety box, sample holder, Bed FACS count 1.5, CELL DYN 1800, was used at the laboratory of DCRH. Each sample labeled with the code corresponding to the participant by the laboratory technicians for identification purpose. The exercise training delivered three times per week in alternate days (Monday, Wednesday and Friday) for a consecutive three months with one hour sessions from 5: 45 PM-6: 45 PM. The blood samples were taken four times within three months, finally hematological analysis was done on the same day.

2.8. Quality Control

To assure quality of the data, different measures undertaken during different stages of the sample collection process: To assure quality trained lab technicians participated and one hour discussion undertaken on how to do with the issue of client privacy and confidentiality particularly when they were taken blood samples and analysis of immunity result. A brief orientation session about the whole purpose of the research project arranged for participants'. To improve quality during sample taking time, the sample collection undertaken in a separate laboratory room. Data completeness checked by supervisors and researcher. A pre test conducted three days prior to the start of actual data collection via floor aerobics training.

2.9. Data Processing and Method of Analysis

The data analyzed by descriptive statistics using mean, standard deviation, mean difference and t-value. The data represented by using tabulation and written explanation. The quantitative data that generated from field experiment and

laboratory test which enter into a computer in Microsoft soft office excel. Statistical analysis was performed using SPSS version 17.0 statistical software package by the researcher. Student's t-test used to test significant differences between pre and post tests of hematological results with respect to sex difference. Mean difference with 95% confidence intervals (CI) was used to compare the effect of determinant factor.

2.10. Ethical Clearance

The study was approved by the School of Graduate Studies and then ethical clearance was obtained from the Ethical Review Committee of College of Health Science, Haramaya University on behalf of the ministry of Science and Technology and the license was given to the researcher for research purposes only. In addition to this, institutional permission was obtained from Dire Dawa HIV/AIDS prevention & control office (DHAPCO), DDC branch before conducting the study. Through these ethical certificates, the chairman of the association was first briefed about the study before meeting with subjects. Then specifically, the participants were informed about the, purpose, duration, procedures, risk and benefits of the study as well as the participation was purely a voluntary activity and the right to participate not participates and stop participation was respected. Issues of confidentiality and anonymity was also maintained even if they were exposed by the laboratory technicians, investigator and assistance data collectors. Subjects signed a consent format. A separate room was prepared for blood sample taking each study subject in order to keep their privacy and confidentiality of their results to prevent from external pressure.

3. Results and Discussions

3.1. Results

3.1.1. Hematological Results of Total Study Subjects

Before and after carried out floor aerobic exercise, the changes of blood property tested: The mean comparison of White blood cells (WBC), red blood cells (RBC), hemoglobin (HGB), hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), red blood cell distribution width (RDW), plateletcrit (PCT), platelet (PLT), mean platelet volume (MPV) and platelet cell distribution width (PDW) (Table 1) of PET and POET one, two and three (POET-1, 2 and 3); Pass Sign-test, $P < 0.05$. It showed that floor aerobics exercise has a significant effect on blood property test values; among them multiple blood property test values were all on the rise after the participants executed floor aerobics exercise. The higher mean value of (WBC, RBC, HGB, HCT, MCV, MCH, MCHC, RDW, PCT, PLT, MPV and PWD) was recorded at POET-3 with compared to PET value (Table 1). There was no significant difference between POET-1 and POET-2. Involving formal aerobic exercise training programs with the increments of duration, frequency, modality and intensity provide a crucial benefit on hematological induction to individuals with HIV/AIDS seen in this study but intensity should not exceed the HR of 150 beats per minutes (physical work capacity (PWC 150) [17]. In order to avoid an immune depression induced by high intensity exercises. Aerobics exercise increase blood volume [18] others state that it does not change [19].

Table 1. *PETR and POETRs of Hematology count, from Yetessfa Bisrat Miskir Association in a selected training hall and Dill Chora Hospital, Dire Dawa.*

Paired Samples Test at (N=52)							
Dependant Variables	**Pre exercise test result (I)**		**Post exercise tests results (J)**			**Paired Differences at (df=51)**	
	Mean	**SD**	**(J) Tests**	**Mean**	**SD**	**MD (J-I)**	**t-value**
			POET-1	7.47	2.35	2.03	-8.957***
WBC	5.43	2.16	POET-2	7.41	2.47	1.98	-6.03***
			POET-3	7.47	2.81	2.04	-7.557***
			POET-1	4.29	0.64	1.35	-16.789***
RBC	2.94	0.57	POET-2	4.06	0.66	1.12	-12.737***
			POET-3	4.90	0.61	1.96	-12.642***
			POET-1	13.65	1.76	2.03	-4.993***
HGB	11.62	1.94	POET-2	13.52	1.85	1.90	-9.125***
			POET-3	14.05	1.71	2.43	-7.150***
			POET-1	39.73	4.94	5.6	-8.788***
HCT	34.13	4.73	POET-2	38.30	4.75	4.17	-10.326***
			POET-3	41.74	4.95	7.44	-8.830***
			POET-1	100.24	11.40	10.30	-8.584***
MCV	89.94	12.12	POET-2	102.10	15.46	12.16	-8.027***
			POET-3	105.31	14.56	15.37	-8.621***
			POET-1	34.28	4.73	5.54	-8.682***
MCH	28.74	4.71	POET-2	34.15	5.98	5.41	-7.521***
			POET-3	34.69	5.76	5.95	-7.534***
			POET-1	33.69	1.56	5.55	-10.758***
MCHC	28.14	2.73	POET-2	33.25	2.77	5.11	-8.359***
			POET-3	33.85	2.12	5.71	-7.109***
			POET-1	14.19	1.73	1.06	-6.646***
RDW	13.130	1.80	POET-2	15.18	2.73	2.05	-4.855***
			POET-3	15.05	2.20	1.92	-5.796***

Paired Samples Test at (N=52)							
Dependant Variables	**Pre exercise test result (I)**		**Post exercise tests results (J)**			**Paired Differences at (df=51)**	
	Mean	**SD**	**(J) Tests**	**Mean**	**SD**	**MD (J-I)**	**t-value**
PLT	218.19	59.64	POET-1	262.85	88.15	44.66	-9.854***
			POET-2	259.35	89.49	41.16	-5.387***
			POET-3	273.16	84.74	54.96	-8.484***
MPV	7.93	0.84	POET-1	9.43	0.97	1.50	-10.964***
			POET-2	9.12	1.06	1.19	-9.879***
			POET-3	9.06	1.26	1.13	-7.490***
PCT	0.17	0.05	POET-1	0.28	0.07	0.11	-9.207***
			POET-2	0.26	0.08	0.09	-9.004***
			POET-3	0.27	0.09	0.1	-8.566***
PDW	15.23	0.92	POET-1	16.25	0.91	1.02	-13.695***
			POET-2	16.45	0.80	1.22	-13.068***
			POET-3	16.49	0.93	1.25	-13.384***

Significant at [t] >2

3.1.2. Comparison of Hematological Results Between Females and Males

An experimental study conducted to study the hematological parameters in the males and females living with HIV/AIDS. Thirty YBMA members' selected from equal sex proportion (26 females and 26 males) HIV positives tested at the age of 30-50 years. The mean comparison of females and males hematological results of PETR with PEOTR assessed and showed that significantly difference at the probability level of 5% and [t] value > 2 (Table 2). The higher mean value of WBC, MCV, MCH and MCHC obtained by females and the remaining hematological parameters highest mean value of RBC, HGB, HCT, RDW, PCT, PLT, MPV, PCT and PDW obtained by males at PEOT with compared to PET value (Table 2). Males obtained a greater amount of RBC HGB HCT MCV PLT MPV PCT of mean difference than females. On the other hand females obtained a greater amount of WBC, MCH, RDW and PDW mean difference than males. The MCV, MCH, MCHC, PLT and MPV results correlated with CD4 counts in both males and females (Table 2). This might be because sex-based differences in pulmonary function and exercise tolerance is primarily from two sources; namely hormones (especially progesterone and estrogen), as well as receptors for the sex steroid hormones are present in numerous non reproductive tissues, including the heart, bone, skeletal muscle, vasculature, liver, immune system, and brain tissue. Involving formal aerobic exercise training programs with the increments of duration, frequency, modality and intensity provide a crucial benefit on females and males hematological count induction to people with HIV/AIDS. But in both sex the intensity should not exceed the HR of 150 beats per minutes (physical work capacity-PWC 150) [17]; in order to avoid an immune depression induced by high intensity exercises.

Changes in the hematological parameters occur according to the type, stress and duration of the exercise. Presumably, these changes are caused by such factors as the methods used in experiments, experiment times, the type of exercises applied, the age, sex and training condition of the subjects [20]. However, there is no complete consensus in the literature how exercise affects on blood concept. Sex-based differences in three systems for which there are prominent differences between men and women: cardiovascular, musculoskeletal, and immune systems [21, 22, 23]. In view of the fact that many sex-based differences are mediated by the actions of the genomic and non genomic mechanisms of sex steroid hormones: estrogens or androgens [24]. There are multiple differences between women and men in terms of their normal cardiovascular function. For example, men have significantly greater left ventricular mass and chamber size than women because the left ventricular ejection fraction is the same in both sexes. Furthermore, there are sex-related differences in the expression of myosin is forms in animal models, suggesting that there may be sex-based cardiac differences that are more complex than a simple difference in size [25]. The stroke volume is larger in men than in women [23].

Table 2. *PETR and POETRs of females and males Hematological count from Yetessfa Bisrat Miskir Association in a selected training hall and Dill Chora Hospital, Dire Dawa.*

Paired Samples Test at (N=52)							
Dependant Variables	**Sex**	**Pre exercise test result (I)**		**Post exercise tests results (J)**		**Paired Differences at (df=51)**	
		Mean	**SD**	**Mean**	**SD**	**MD (J-I)**	**t-value**
WBC	F	5.56	1.71	7.76	1.69	2.20	-7.167***
	M	5.30	2.60	7.17	2.90	1.87	-6.717***
RBC	F	2.80	0.55	4.69	0.61	1.89	-7.808***
	M	3.08	0.57	5.10	0.61	2.02	-10.148***
HGB	F	11.58	1.31	13.68	1.10	2.11	-5.302***
	M	11.66	2.46	14.42	2.22	2.75	-3.308***

Paired Samples Test at (N=52)							
Dependant Variables	Sex	Pre exercise test result (I)		Post exercise tests results (J)		Paired Differences at (df=51)	
		Mean	SD	Mean	SD	MD (J-I)	t-value
HCT	F	33.77	3.91	40.72	3.65	6.95	-9.588***
	M	34.48	5.57	42.75	5.94	10.28	-5.207***
MCV	F	92.62	10.70	107.21	12.70	14.58	-10.101***
	M	87.25	13.26	10.34	16.51	16.15	-4.859***
MCH	F	28.99	4.18	34.23	3.83	6.24	-7.646***
	M	28.49	5.35	35.15	7.33	5.66	-4.086***
MCHC	F	28.12	2.66	33.85	2.02	4.84	-5.141***
	M	28.16	2.89	33.84	2.30	4.38	-4.731***
RDW	F	12.62	1.77	14.64	1.53	2.02	-4.827***
	M	13.64	1.76	15.46	2.72	1.82	-3.440***
PLT	F	221.77	56.17	266.08	65.52	44.31	-7.819***
	M	214.62	65.01	280.23	110.82	65.61	-3.354***
MPV	F	7.94	0.90	8.96	1.19	1.02	-5.995***
	M	7.92	0.82	9.16	1.37	1.24	-4.899***
PCT	F	0.17	0.03	0.25	0.06	0.09	-6.723***
	M	0.18	0.06	0.28	0.11	0.10	-5.590***
PDW	F	15.05	0.69	16.32	0.85	1.28	-8.749***
	M	15.42	1.10	16.65	1.02	1.23	-9.990***
Significant at [t] >2							

3.2. Discussions

In healthy individuals, physiologic exercise and relevant mechanical loading promotes specific response in systemic and local immune and hematologic parameters and muscle function [26, 28]. Most of the patients with RA suffer from impaired muscle function such as (or including) imbalance and reduced muscle strength [29]. The symptoms of RA, such as joint swelling, pain, stiffness, and other complications, may hamper the physical training and reduce physical fitness [30, 31]. Chronic inflammation and destruction of the joints result in deformities that also exacerbate the inactivity in the patients with RA [27]. This makes a vicious cycle in which the inactivity resulted in decreased muscular balance and joint deformity that in turn causes pain and disability. The pain prohibits the patient from exercise and moving the joints leading to the aggravation of the vicious cycle [32]. The inactivity and lack of exercise also result in decreased level of hemoglobin (Hb) and hematocrit (HCT) because of the decrease in intramedullary hematopoiesis. Chronic inflammation in the patients with RA also can cause anemia of chronic disease [33]. The aerobic performance is enhanced by prolonged endurance training through improving oxidative capacity and increasing glycogen stores of the muscle cells [34]. Growing lines of evidence have demonstrated that exercise is beneficial for RA patients. Exercise has beneficial effects on the physical parameters of RA, including pain, fatigue, quality of life, aerobic capacity and muscle strength without inducing any structural damage [35-39]. A wide range of exercises, including strengthening and aerobic exercises, are concluded to be safe without any adverse effects on the patients with RA [40, 41]. Although the aerobic exercise improves the functional parameters of RA, its effects on the path physiology of the disease remain to be elucidated. The exercise, especially the aerobic subgroup, in healthy individuals result in increased total Hb concentration, HCT, and red blood cell (RBC) mass [42]. The aim of the current study is to investigate the effects of moderate aerobic exercise on the Hb, HCT, and RBC mass of women with RA.

Physical activity is a major modifiable determinant of chronic disease [43]. The Australian National Physical Activity Guidelines for Adults recommend that for good health, "adults should put together at least 30 min of moderate intensity physical activity on most, preferably all, days." The aerobic exercise has been shown to be associated with increased RBC mass, Hb, and HCT in healthy individuals [42]. During the current study we tried to determine the effects of aerobic exercise on hematologic indices of women with RA. They found that although 8 weeks of aerobic exercise resulted in increased HB, HCT, and RBC mass in women with RA, the difference was not significant when compared with that in controls. In other words, the increase in RBC count, Hb, and HCT could not be attributed to aerobic exercise in women with RA. Further research is required to elucidate the effects of aerobic exercise on hematologic indices of the women with RA. During the exercise, oxygen, which is carried by RBCs, is transferred through the network of arteries and capillaries in the circulatory system. The oxygen demand and production of carbon dioxide increase and the demand for more RBCs and then oxygen consumption with generating of superoxide anion increases. The body responds by increasing the number of RBCs and also in other ways to increase the oxygen-carrying capacity of blood [44, 45].

Various surveys have shown changes in cytokines and natural killer cell activity (effects of three different types of exercise on blood leukocyte count during and following exercise). HB, HCT, and RBC have basic duty of transferring oxygen to active tissues. Body capacity and maximum

oxygen uptake depend on transferring of active oxygen to active tissues. Therefore, the importance of hematological indexes in body efficiency is obvious [45]. It has been shown that the hematological indices decrease after aerobic exercise due to increase in plasma volume. The increase in plasma volume results in a decrease in Hb concentration. [31] Tocopherols and ubiquinones are intrinsic lipid components, which are involved in antioxidant protection, and also glutathione is an important water soluble antioxidant. [46] Metsios *et al.* [47] demonstrated that 12 weeks of aerobic exercise was associated with improved endothelial function in patients with RA. They also showed that an exercise program designed to meet individual needs and physical abilities significantly improves micro vascular and macro vascular function in parallel with disease-related characteristics in RA patients. There is a significant increase in estimated maximum oxygen uptake in those who receive aerobic exercise and medical therapy [48]. Greater cardio respiratory fitness has long been associated with the decreased risk of disease and death. [49] Obese individuals with higher fitness levels generally have lower mortality rates compared to sedentary normal-weight counterparts. [50] Previous studies have shown increases in maximum oxygen uptake from baseline levels after resistance exercise training [51] and combined aerobic and resistance exercise training [50]. All these investigations are in support of aerobic exercise in those with RA. However, the current study failed to show a significant increase in hematologic indices of the patients with RA.

4. Conclusions and Recommendations

4.1. Conclusions

This study showed that moderate intensity floor aerobic exercise training implemented by trained professional is both safe and effective in HIV-infected persons. Finally this finding occluded that increasing duration, frequency, intensity and modality of floor aerobics exercise might have beneficial effects on hematological change of people living with HIV/AIDS individuals and also might have effects on hematological count difference between males and females' HIV-infected individuals due to sex based difference.

4.2. Recommendations

On the basis of the above results, discussion and conclusion the following recommendation were providing for proper implementation of floor aerobics exercise to assure hematological induction with regards to:

I. People living with HIV/AIDS are advisable engaged in consistent and moderate intensity of floor aerobic exercise throughout the entire illness.
II. The intensity not exceeds the heart rate of 150 BPM (physical work capacity); in order to avoid an immune depression induced by high intensity exercises.
III. Floor aerobic exercise not recommended during rapid weight loss.
IV. It is advisable that People living with HIV/AIDS supported by multi-disciplinary sport science professionals and clinical nurses throughout the course of floor aerobic exercise.

Acknowledgement

First and foremost Praise is to the almighty GOD for the opportunity and capacity given me realize to my aspiration and enabling me compiles this thesis work. I owe my sincere thanks and compliments to my advisors Molla Deyou (PhD) and Shemiles Mekonnen (PhD) for their guidance, kindness and encouragement during the entire span of my work. Second my special gratitude also goes to Yetessfa Bisrat Miskir Association members particularly for the study participants who took part in this study. Without them this study would not be possible. My deep gratitude also goes to Abayneh Kebede, coordinator of Yetessfa Bisrat Miskir Association for his invaluable support in bringing me the participants to take part in the study with a clear understanding. Third I am very grateful to Dire Dawa University for sponsoring this study to publish without which this study couldn't be possible to reach the society. Fourth I am also thankful for the office of ethical review committee of College of Health Science, Harames University, for providing me a constructive professional comment, suggestions and necessary corrections during my thesis proposal writing up. Fifth I would also like to extend my thanks to Dill Chora Hospital covering all the necessary laboratory inputs and staffs who participated in this study as the data collectors, especially I express my deepest thanks to Dr. Abnet Eliayas, chief medical officer and Mr. Daniel Demssie, laboratory technician of Dill Chora Hospital. Six I am also thanks to Medhanialem Primary and Secondary School for providing me a training hall with the necessary facilities; especially I express my deepest thanks to Mr. Kebede Teferie, former director of Medhanialem Primary and Secondary School. Seventh Last but not least, my heartfelt gratitude goes to my families, colleagues and friends for their continuous encouragement and support in the accomplishment of this work.

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