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Research Article

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Effects of Aerobic Exercise on Viral Load Count among People Living with HIV/AIDS in Nekemte, Ethiopia

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Summary

Background: *Literature consistently shows a dearth of published data from developing countries on the effect of exercise for HIV infected persons.*

Objective: *The study was aimed to determine the effect of aerobic exercises on viral load among people living with HIV/AIDS in Ethiopia, Nekemte.*

Methods: *In this randomized clinical controlled trial, 58 volunteered participants were randomly assigned to experimental and control groups. Baseline values of the variables were determined. Experimental group participated in moderate intensity aerobic exercise for 12 weeks, whereas the control group was encouraged to continue usual ART and the usual day to day work. For both CG and EG groups, viral load count was made twice, before and after intervention.*

The results: *Mean age of the participants were (34.66 + 4.56) and (38.1+ 4.90) of control and experimental groups respectively. Baseline of experimental group and control group had show insignificant (p=0.20). After exercise, pre post of exercise group show statistically significant differences (p=0.01) but control group insignificant pre-post (p=0.21).*

Conclusion: *Viral load of PLWHIV/AIDS who participated in the 12 weeks aerobic exercise were more decreased than the control group.*

Keywords: HIV, Viral Load Counts, Antiretroviral (ART), Treadmill, Aerobic Exercise

Abbreviation

HIV- Human Immunodeficiency Virus
AIDS-Anti Immunodeficiency syndrome
PLWHIV- people living with HIV
ART- Antiretroviral therapy
SD- standard deviation
EG- experimental group
CG – control group
ARV attending antiretroviral
NAC- National AIDS Council

Introduction

Anti immunodeficiency synderm (AIDS) epidemic is one of the most destructive health crises of modern times ravaging families and communities around the world. By the end of 2008, UNAIDS/WHO estimated that globally, a total of 33.4 million people were living with Human Immunodeficiency Virus (HIV), whereby 31.3 million were adults. In sub-Saharan Africa, 22.4 million people were living with HIV in 2008 [1]. Currently 367,000 patients, including 23,000 children under the age of 15, are taking ART. Based on the estimation given in 2014, the ART need is 542,121 for adult and 178,500 for children under age 15 years of age [2]. In Ethiopia,

free ART service was launched in January 2005 and public hospital started providing free ARTs in March 2005. Currently ART service is available at 1045 Health facilities. On the basis of the 2010-2014 strategic plan, ART coverage for adult (age 15+) has reached 76%, but the coverage remains low (23.5%) for children (age <15) living with HIV [2].

According to single point HIV related estimates and projections for Ethiopia 2014, the national HIV prevalence is 1.14%. The recent 2011 Ethiopia Demographic and Health Survey (EDHS) was shown that the urban prevalence was 4.2%, which was seven times higher than that of the rural (0.6%). The 2011 EDHS also show that the HIV prevalence varies from region to region, ranging from 0.9% in (south nation, nationality of people regionally) SNNPR to 6.5% Gambela. Furthermore, the HIV related estimates and projections indicate that the 2013 prevalence from 0.8% to 5.8% [3].

The study reported that aerobic exercise acts as an immune stimulant for both HIV positive and HIV negative individuals by creating a type of natural vaccine [4]. These scholars asserted that aerobic exercise if widely adopted will contribute to the worldwide reduction of HIV pandemic and probably leads to its prevention.

The authors therefore investigated that this little or no attention paid to the efficacy of exercise on the health of HIV infected persons in Ethiopia may be the basis for the lack of literature on the effect of exercise on the health of the overwhelming population living with HIV and AIDS in the country [5]. Probably, this may be the rationale why the authors have observed over the years, the non inclusion of therapeutic exercise as one of the treatment strategies for the vast number of HIV population attending antiretroviral (ARV) clinic at health centers. The failure to include exercise in the management of HIV infected persons may be as a result of lack of very good knowledge on the effect of exercise on HIV population among substantial number of health care professionals as reported by [6].

Methods

Study area and study design

This study was conducted in Nekemte town found in the east Wollega zone, Oromia regional state, Ethiopia. The study design was pre-post randomized controlled clinical trial. It was 12-weeks aerobic exercise training intervention of three days per week supervised aerobic exercise.

Selection of the subject

Fifty eight (58) volunteers of both male and female in the age range of 18 – 45 years old were selected to be research participants but 43 were completed pre-post test. By using simple random sampling lottery method, 29 participants were assigned in control and 29 in the experimental groups. Of the total 58 participants, 33 were female and 25 were male. The researchers used inclusion and exclusion criteria during the selection of participants. Accordingly, those who were on antiretroviral therapy for at least three months; those were able to walk without assistive devices, those who had CD4 count greater than 350 cells per cubic millimeter and those who were free of any external infections were included into the study. Whereas, pregnant and lactating women, people with history of central nervous system dysfunctions, amputee and diabetes were excluded.

Administration test data collection

The laboratory assay of blood analysis was performed by with the participants' physicians under super vision of researchers. Blood was drawn from an arm vein before and again after 48 hr the end of the intervention period, in order to measure viral load, using standard laboratory protocol for persons living with HIV/AIDS.

Training protocol

Table 1: Twelve weeks training program

Stages	Week	Sessions	Type of exercise	Duration (min)	Type of exercise
Phase-in	1-2	6	Aerobic	15-20	50% of HRmax
Step 1	3-4	6	Aerobic	40	55% of HRmax
Step 2	5-6	6	Aerobic	40	60% of HRmax
Step 3	7-8	6	Aerobic	40	65 % of HRmax
Step 4	9-10	6	Aerobic	40	70% of HRmax
Step 5	11-12	6	Aerobic	40	75% of HRmax

Ethical considerations

Approval and ethical clearance of the protocol was sought for Health Research and Ethical Review Committee of Mekelle University registration No ERC0771/2016 and registered under clinical trials. Gov of registration NO. NCT03009149.

Data analysis

Descriptive statistics of percentages and frequency counts summarized socio-demographic characteristics of the participants. Paired t-test compared significant difference between the variables at baseline and 12th week in the experimental group and the control group. The independent t - test was used to analyze significant difference in the variables between the control and experimental groups at baseline and the end of the study. All analyses were executed using Statistical Package for the Social Sciences (SPSS) version 20.0 software. $P< 0.05$ was considered significant.

Results

Demographic information

23 experimental and 20 control participants of total 43 (28 female, 15 male) completed both pre and post evaluations of viral load. Fifteen subjects of which 6 experimental (2 female and 4 male) and 9 control groups (3female and 6 male) dropped out of the study due to lack of interest and some unsatisfied financial/family problems. Participants in the experimental group attended on average 25.44 days (70.7%) of the supervised exercise sessions. The mean monthly income of the participants was 987.3 per where male 934.8 and female 1027.15. The mean time under ART was 3.5 years. Most participants were married (n = 31, 53.4%); 11 (18%) of them were single, 10 (17.2) of them were living as married and the rest 6 (10.3) was divorced. According to the social, demographic data obtained from the survey, marital status, gender, income per month, educational level and length of diagnosed were mentioned below (Table 1).

Table 1: Socio-demographic Characteristics of the Participants (n = 64)

Variables	CG	EG
Age	34.66	38.1
Gender		
M	7	8
F	13	15
Marital status		
Single	6	5
Married	16	15
Living as married	5	5
Divorced	2	4
Income per month (Birr)	979.24	995.44
Year of ART	4	3
Session		25.44
Educational level		
None	0	0
Elementary	6	3
High school	9	12
Preparatory	4	5
Diploma	1	3
First degree	0	0
Second degree	0	0

Table 2: Independent-test on mean baseline viral load profile of the control and experimental groups

Variables	Exp. Group (M+SD)	Control group (M+SD)	Mean difference	T-Test	P-value
Viral load	7453(186)	6265(916)	1188	-1.29	0.20^{NS}

NOTE – NS Shows where an non-significant, p > 0.05

Pre-test of dependent variables was analyzed using independent t-test. The mean difference of experimental to control was used to see intervention effects. The baseline assessment results of both experimental and control group (n=43) were assessed using the independent t-test. Viral load of participant's analyses in the study was presented in Table no 2. Viral load analysis has shown the mean difference 1188 and p-value 0.20.

Table 3: Paired t-test analysis comparing the baseline and 12th week mean values of viral load in the experimental and control groups

Group	Variables	Pre-test (M+SD)	Post-test (M+SD)	MD
Exp. Group (M+SD)		7453(186)	2457(456)	4996
Control group (M+SD)	Viral load	6265.05(916)	2928.85(155)	3737

Note **significant at p<0.01 ExG NS-Shows where asnon-significant difference exists in CG p>0.05

Twelve weeks later it was conducted to evaluate dependent variables of control group and experimental group. Paired-samples t-test was pointed statically significant of both experimental group (p=0.00) and control group (p=0.01) in viral load. In experimental group viral load was more reduced than control group. Mean difference (MD) of experimental and control of pre-post was4996 and 3737 respectively.

Table 4: Independent t-test for mean of post test 12th weeks values viral load of the control and experimental groups

Variables	Exp. Group (M+SD)	Control group (M+SD)	Mean difference	T-Test	P-value
Viral load	2457(456)	2528.35(155)	71	-1.27	0.21^{NS}

NS-Shows where an non-significant difference exists, that is, p > 0.05

12th weeks mean of independent t-test analyzed to compare values of viral load of experimental and control groups. According to data analyzed there was insignificant difference between the control and experimental group. The result of viral load was indicated means difference -4445.30, p=0.21

Table 5: Independent t-test for mean of post test 12th weeks values viral load of the control and experimental groups

Variables	Exp. Group (M+SD)	Control group (M+SD)	Mean difference	T-Test	P-value
Viral load	2457+4256.13	6899.35+15005.09	-4445	-1.27	0.21

*Shows where an insignificant difference exists, that is, p > 0.05

Discussion

The main objective of this study was to examine the effect of aerobic exercise on Viral load, among people living with HIV/AIDS. According to data obtained exhibited a 25.8% drop-out rate which is consistent with the findings of a Meta analysis on aerobic exercise and HIV/AIDS, in which six studies reported dropout rates higher than 20% and two others higher than 50% [7]. Furthermore, our experimental participants achieved higher completion than control group exercise (85% and 75%, respectively) reported by Fillipas et al [8-11].

At baseline, the independent t-test showed the insignificant difference in the variables between the experimental and control groups. P-values of exercise group and control group were 0.20 (Table-2). This implies homogeneity of the two groups; hence observed changes at the end of this study could be attributed the effect of the aerobic exercise training.

The present study showed that a three-month aerobic exercise program can lead to significant change in viral load among people living with HIV/AIDS. According to paired pre-post test result on table No 3 the result of baseline and 12 week viral load within a group of experimental group and control group showed p-value 0.00 and 0.01 respectively but mean difference had screened out as redaction of viral load occurred. This indicated that in addition to ART therapy aerobic exercise has own contribution in control HIV infection by controlling increment of viral load. Independent t-test have shown that both baseline and after 12 weeks insignificant p=0.20 and p=0.21 respectively.

Immunological markers not only give predictive information on HIV, but they are also linked to HIV-related illness and mortality [12]. Study of clinical trials have consistently shown significant improvements in HIV RNA levels after moderate aerobic training [13,14]. The study of this finding confirms these observations.

Conclusion

Twelve weeks aerobic exercise training improved CD4 cell counts and psychosocial. Aerobic exercise has a positive effect on the stability of viral load in people living with HIV/AIDS when it combines with ART rather than ART alone. The quantitative data provided confirmation that a 12 week aerobic exercise program enhanced the health states, and made it stable on viral load. It seems that aerobic exercise is a safe, complementary method to manage HIV symptoms, and in this manner enhances of immunity. The conclusion can be made that, aerobic exercise does slow down the progression of the disease; it is safe for HIV patients. Bearing in mind all the benefits derived from aerobic exercise, this safe modality should be highly recommended for the management of HIV symptoms [15-38].

Declarations

Acknowledgements

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Availability of data and materials

Individual patient data will not be shared as consent for this was not obtained from participants. Data and materials available on request from the corresponding author.

Authors' contributions

In the study, the authors, participated in the study design, collected data and revised the manuscript critically for intellectual content. I addition performed the statistical analysis and drafted the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

Approval and ethical clearance of the protocol was sought for Health Research and Ethical Review Committee of Mekelle University registration No ERC0771/2016 and registered under clinical trials. Gov of registration NO. NCT03009149.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

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