

Effect of Aerobic Exercise on CD4 Cell among People Living with HIV: Randomized Control Trial

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Abstract

Objective: The main objective of this study was to see the effect of aerobic exercise among people with HIV.

Methods: The area where study was conducted Nekemte. Fifty eight subjects were selected from those met the inclusion criteria. The subject of the study was grouped into control and experimental. Before subjects were expose for aerobic exercise pre-test result were taken in order to comperere intervention effect. Aerobic exercise of moderate intensity were given to experimental group whereas control group attend their ART and regularly participated on their activity. To conduct this study ethical clearance was colated from Health Research and Ethical Review. Data gathered within three months were analyzed by SPSS version 20. Significance level was set at $P < 0.05$.

Result: In control and experimental groups mean ages of participants were $34.66 \pm (4.56)$ and $38.1 \pm (4.90)$ respectively. In the experimental group from the result of significant change was observed ($p < 0.05$) in the variables between pre-tests and post-tests. Where significant change observed in experimental group, there was no significant change observed in control group.

Conclusion: The immune (CD4) cell counts of the subject under aerobic exercise were shown significant change after 12 weeks of aerobic exercise.

Keywords: CD4 Cell; Aerobic Exercise; ART

Introduction

Acquired Immune Deficiency Syndrome (AIDS) epidemic is one of the most affect human health that affect family as well as economy of the country. By the end of 2008, UNAIDS/WHO estimated that globally, a total of 33.4 million people were attacked by Human Immunodeficiency Virus (HIV), whereby 31.3 million were adults. African country, which was found within sub-Saharan Africa, 22.4 million people were living with HIV in 2008 [1].

Ethiopia was conducting the research in 2014 and reported that prevalence was 1.14%. The recent 2011 Ethiopia Demographic and Health Survey (EDHS) was shown that the urban prevalence was 4.2%. The result pointed out that rural affected lesser than that of urban.

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The 2011 EDHS also show that the HIV extension varies from region to region, ranging from 0.9% in (south nation, nationality of people region) SNNPR to 6.5% Gambela. Furthermore, the HIV related estimates and projections indicate that the 2013 prevalence from 0.8% to 5.8% [2].

The Government of Ethiopia has been staying the same for a long time in its response to the epidemic. For instance, the government established a National HIV/AIDS Task Force within the Ministry of Health in 1985, prior to the first laboratory diagnosis of HIV in Ethiopia. In addition, in 1987-89 both Short-Term Plan and Medium-Term Plan were drawn out to respond the budding epidemic. The government responded by issuing a national AIDS policy which is the strategic framework and the establishment of a multi-sectoral and broad-based National AIDS Council (NAC) and the secretariat, which evolved to the current HIV/AIDS Prevention and Control Office (HAPCO) as the epidemic began to spread. The epidemic still has continued to prevail both in rural and urban settings claiming the lives of the most productive segment of the Ethiopian society despite these and other efforts carried out. At present situation HIV/AIDS has become one of the utmost challenges to the socioeconomic development of the country. The high prevalence of HIV/AIDS in this most productive age has great impact on health, economic and social aspects [5].

Therefore, the authors were predicted that this little attention or complete absence of attention to the efficacy of exercise on the health of HIV infected people in Ethiopia. May be its due to the lack of literature on the effect of exercise on the health of the overwhelming population living with HIV and AIDS in the country. Probably, this may be the reason why the authors have observed over the years and years, the non-inclusion of therapeutic exercise as one of the treatment strategies for the huge number of HIV population attending antiretroviral (ARV) clinic at health centers. As a result of lack of great knowledge on the effect of exercise on HIV population among substantial number of health care professionals is the reason for failure to incorporate exercise in the management of HIV infected persons. These observations and report, as well as the poverty of literature in Ethiopia on this field prompted the authors to notion this study.

Methodology

Study area

This study was conducted in Nekemete town found in the east Wollega zone, Oromia regional state, Ethiopia. It is found 311kms from the capital city, Addis Ababa. 58 volunteers of both male and female in the age range of 18 - 45 years old were selected to be research participants. By using simple random sampling method 58 subjects were randomized to control and experimental group 29 each. 33 were female participants and 25 were male participants of the total 58 participants. During the selection of participants, the researchers were used inclusion and exclusion process. Accordingly, those who were on antiretroviral therapy, those were able to walk without assistive devices, and those who were free of any external infections were included into the study were included. Whereas, pregnant and lactating women, people with history of central nervous system dysfunctions and diabetics were excluded.

Study design

It was 12-weeks aerobic exercise training intervention of three days per week of 40 min supervised aerobic exercise. Approval and ethical clearance of the protocol was sought from Health Research and Ethical Review Committee of Mekelle University registration No ERC0771/2016 and registered under clinicaltrials.gov of registration NO. NCT03009149.

Randomization

Fifty-eight (n = 58) subjects of PWHIV were grouped into the experimental group (n = 29) and control group (n = 29) by a simple random sampling method. Grouping the subjects into control and experimental was done by fifty-eight numbered papers secretly with a number "1" (29) and "2" (29). It had enveloped, placed and mixed in a basket. Then, all the participants were asked to pick one paper.

Participants who pick papers coded “1” assigned into experimental group were as those who picked papers coded “2” were assigned into the control group.

The experimental group underwent to aerobic exercise intervention for 12 weeks and control group continue their usual day to day activity. Prior to the intervention, the pre-test was taken for all the subjects and after the 12 weeks, the post test was conducted. The control group was visited at 4th, 8th, 12th weeks during the study period.

Sample collection

For the purpose of the study all the necessary information about the study was explained to the participants by the researcher along with the health professional. The orientations explained to the participant about the aerobic exercise protocol, ethical consideration, the center of intervention and laboratory test. Confidentially, of the information collected from the subjects was assured. It was also explained that study participant had the right to withdraw it at any stage of the study. After attending the orientation on the awareness of, study and reading the necessary document, potential participants decided whether to continue with the study or not. Each experimental data which was gathered are nameless with coded to the privacy. Dependent variable test taken was CD4 count.

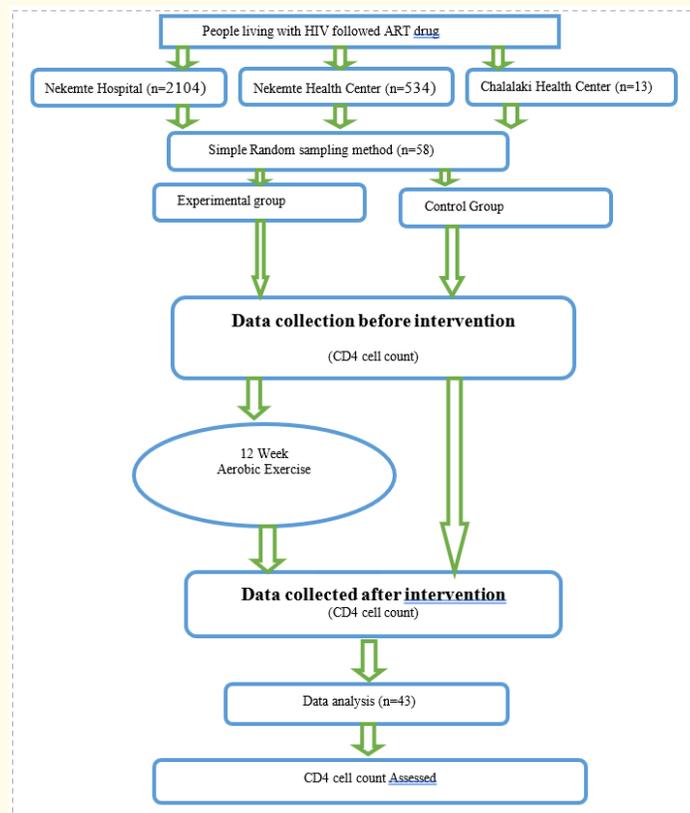


Figure: Study flow chart.

Data analysis

Paired t-test compared notable difference between the variables at baseline and 12th week in the control group and experimental group. The independent t-test was used to analyze notable difference in the variables between the control and experimental groups at the baseline and the end of the study. All analyses were accomplished by using Statistical Package for the Social Sciences (SPSS) version 20.0 software. A value of P < 0.05 was considered statistically notable.

Results

Participants

Initial enrollment was included 29 participants in both the experimental group and control group. Of these, females were 55.9% (n = 33) and male was 44.1% (n = 25). At the end of the 12-week the data of 43 participants (Control group: 20, Experimental Group: 23) were analyzed. During the study, 25.8% (n = 15) were dropouts. Of this dropout experimental n = 6 and control group n = 9 dropped out of the study. In the experimental group participants attended on average 70.7% of the exercise sessions.

Variables	Exp. group (M ± SD)	Control group (M ± SD)	Mean difference	t-Test	p-value
CD4 count (cells/mm ³)	456.69 ± 65.36	446.95 (68.98)	-9.74	-0.475	0.63**

Table 1: Independent t-test of mean baseline and CD4 cell count of the control and experimental group.

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

Group	Variables	Pre-test	Post-test	Mean difference	p-value
Exp. group (M ± SD)	CD4 count (cells/mm ³)	456.69 ± 65.36	513.13 ± 55.60	56.43 ± 48.51	0.00*
Control group (M ± SD)		460.05 ± 68.01	456.70 ± 70.90	9.75 ± 19.94	0.07**

Table 2: Summary of paired t-test analysis comparing the baseline and 12th week mean values of CD4 cell count of experimental and control groups.

* : Shows where significant difference exists, p < 0.05 whereas ** insignificant p > 0.05.

Variables	Exp. group (M ± SD)	Control group (M ± SD)	Mean difference	t-Test	p-value
CD4 count (cells/mm ³)	513.13 ± 55.60	456.70 ± 70.90	-56.43	-0.475	0.03*

Table 3: Independent t-test on mean 12th week values of CD4 cell count of the control and experimental groups.

* : Shows where significant difference exists, that is, p < 0.05.

Discussion

This study exhibited a 25.8% drop-out rate which is consistent with the findings of HIV/AIDS and a meta-analysis on aerobic exercise, in which six studies reported as dropout rates are higher than 20% and two others higher than 50% [8]. Furthermore, our control participants achieved lesser completion than experimental group exercise (75% and 85%, respectively) [8-10] and the same rate (81%) [13].

In HIV infected persons effect of moderate intensity aerobic exercise on CD4 cell counts was examined. At baseline, independent t-test showed insignificant differences ($p = 0.63$) (Table 1) in the variables between the control groups and experimental groups. This implies baseline similarities of both experimental and control groups; hence observed changes at the end of this study could be imputed to the effect of the aerobic exercise training.

The absolute changes in the study indexes are compared pre-post experimental group and the result was shown in table 2. Accordingly, there was a significant difference observed in CD4 cell count with in pre- and post-experimental groups ($p = 0.001$), whereas no significant change observed in the control group ($p = 0.07$).

The result analyzed (Table 3) by independent sample t-test indicated that after three-month, there was significant difference observed between control and experimental group ($p = 0.03$). This indicated that aerobic exercise program can lead to substantial improvements in CD4 cell count among people living with HIV/AIDS among experimental group. This finding confirmed that in addition to ART therapy aerobic exercise has own contribution in control HIV infection by increasing CD4 cell count.

Immunological markers are linked to HIV-related illness and mortality and also give predictive information on HIV [16]. Study of clinical trials have constantly shown significant improvements in CD4+ T cell count levels after adequate aerobic training [16,18]. Our findings confirm these observations.

Our trial included that people who are participating in aerobic exercise may have indirectly caused a normalization of stress induced CD4+ T cell count depletion. A similar result was reported in a study performed before the HAART era in which a 10-week aerobic exercise program showed an increase of CD4+cell count in individuals with the exercise intervention [16,20]. Another possible explanation is the social support that our exercise intervention provided which may have caused better adherence to HAART and subsequently improved immunological profile in the exercise group. Similar results on social support and enhanced adherence to HAART have already been demonstrated in several previous studies [9,10,13,16].

Conclusion

Aerobic exercise has a positive effect on the Immune (CD4 count) 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 status. It seems that aerobic exercise is a safe, complimentary 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.

Bibliography

1. UNAIDS, WHO. Report on the global AIDS EPIDEMIC (2011).
2. FDEMH. "Country progress report on the HIV response". *The Federal Democratic Republic of Ethiopia* (2014).
3. JA Woods., *et al.* "Effects of 6 months moderate aerobic exercise training on immune function in the elderly". *Mechanisms of Ageing and Development Journal* 109.1 (1999): 1-19.
4. EDHS. HIV/AIDS in Ethiopia: Ethiopia Demographic and Health Survey (2011).
5. Action IFOR. "Federal Democratic Republic of Ethiopia Ministry of Health Policy and practice 6.1 (2014).

6. Dudgeon WD, *et al.* "Physiological and Psychological effects of exercise interventions in HIV disease". *AIDS Patient Care* 18.2 (2004): 81-98.
7. Tiozzo E, *et al.* "Short-term combined exercise training improves the health of HIV-infected patients". *Journal of AIDS and Clinical Research* 5 (2013): 80-89.
8. O'Brien K, *et al.* "Effectiveness of aerobic exercise in adults living with HIV/AIDS". *Medicine and Science Sports and Exercise* 36.10 (2004): 1659-1666.
9. Terry L, *et al.* "Exercise Training in HIV-1 Infected Individuals with Dyslipidemia and Lipodystrophy". *Medicine and Science in Sports Exercise* 38 (2006): 411-417.
10. Veljkovic V. "Can exercise help prevent and treat AIDS?" The Institute of Science in Society (ISIS) report (2005).
11. Maduagwu SM, *et al.* "Effect of Aerobic Exercise on CD4 Cell Count and Lipid Profile of HIV Infected Persons in North Eastern Nigeria". *Journal of AIDS and Clinical Research* 6 (2015): 508.
12. Perna F, *et al.* "Cardiopulmonary and CD4 cell changes in response to exercise training in early symptomatic HIV infection". *Medicine and Science in Sports and Exercise* 31 (1999): 973-979.
13. Ramirez-marrero FA, *et al.* "Physical and leisure activity, body composition and lifestyle in HIV-positive Hispanics in Puerto Rico". *Journal of the Association of Nurses in AIDS Care* 15.4 (2004): 68-77.
14. Shaheen HA. "The Acute Effect of Endurance Exercise on Lipoproteins Measured by Nuclear Magnetic Resonance (NMR) in Healthy Men" (2012).
15. Stringer WW. "HIV and aerobic exercise". *Sports Medicine* 28.6 (1999): 389-395.
16. Smith CV. "The Mysterious Origin of Human Immunodeficiency Virus" (210).
17. Joseph T. "The Benefits of Exercise Training for Quality of Life in HIV/AIDS in the Post-HAART Era". *Sports Medicine* 34.8 (2004): 487-499.
18. Baigis J, *et al.* "Effectiveness of a Home-Based Exercise Intervention For HIV-Infected Adults: A Randomized Trial". *Journal of the Association of Nurses in AIDS Care* 13 (2002): 33-45.
19. Bopp C. "Physical activity and immunity in HIV infected individuals". *University of Tennessee* (2004).
20. Ciccolo J, *et al.* "The benefits of exercise training for quality of life in HIV/AIDS in the post-HAART era". *Sports Medicine* 34.8 (2004): 487-499.

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