# Effect of Aerobic Training and Acute Exercise on Vitamin E Levels Among Sedentary Young Men

**Dhinu M.R.**

Associate Professor, Dept. of Physical Education and Sports, Sree Sankaracharya University of Sanskrit, Kalady, Kerala-683574

## Abstract

The purpose of the study was to find out the effect of aerobic training and acute exercise on vitamin E levels among sedentary men. Twenty healthy sedentary males aged between 20 to 23 were selected randomly from Annamalai University, Annamalainagar after seeking their voluntary control to participate in the study. The subjects were randomly assgined into experimental and control group. Aerobic training for three days a week was given to the experimental group. The control group did not undergo experimental training. The effect of acute exercise was measured by Cooper's 12 min run/walk test. Blood samples were collected from each group under four conditions; (I) Before the commencment of Experimentation, (a) before Acute exercise (Cooper's 12 min run/walk), (b) after Acute exercise (Cooper's 12 min run/walk), (II) After the completion of experimentation for nine weeks, (a) before Acute exercise (Cooper's 12 min run/walk), (b) after Acute exercise (Cooper's 12 min run/walk). Tocopherol was estimated by the method of Baker and Frank (1968). The result of the study indicates that vitamin E level decreased after aerobic training and acute exercise.

**KEYWORDS** : Aerobic Training, Acute Exercise, Oxidative Stress, Vitamin E

## Introduction

Strenous physical exercise results in an increase in the metabolism of our system which in turn leads to increased production of free radicals. Free radical accumulation has been observed in skeletal muscle after exercise. Free radical production and subsequent lipid peroxidation are normal sequeal to rise in oxygen consumption concomitant with exercise (Alessio et al 1988). Lipid peroxidation is a chain reaction initiated by free radicals. The biological effects of lipid peroxidation are structural damage to membranes, decrease of membrane fluidity, increase of membrane leakness, release of contents of cells and organelles, loss of essential fatty acids, erosion of antioxidant protection, formation of cytotoxic aldehydes and inactivation of membrane bound enzymes.

The biological system is endowed with protective mechanisms which tend to control the free radical mediated reactions and minimize the damage caused by the reactive oxygen species. These are the antioxidants which convert reactive oxygen species either to oxygen by oxidation or water by reaction. The antioxidants are either enzymatic or non enzymatic in nature.

Vitamin E ( α tocopherol ) is a non enymatic antioxidant in the body. Biochemical and physical methods have identified Vitamin E as the major lipid soluble free radical scavenging antioxidant in biological membranes. By scavenging oxygen free radicals, Vitamin E interrupts cascade reaction of free radical production thus maintaining the

structural and functional integrity of cell membrane. The level of Vitamnin E is indicative of lipid peroxidation. The study is intended to assess the effect of aerobic training and acute exercise and the reultant adapatations if any on the levels of Vitamin E.

**Methods**

Twenty healthy sedentary males aged between 20 to 23 were selected randomly from Annamalai University, Annamalainagar after seeking their voluntary control to participate in the study. The subjects were randomly assgined into experimental and control group. The experimental period was twelve weeks. The schedule of training programme is presented in Table 1. Aerobic training for three days a week was given to the experimental group. The control group did not undergo experimental training. The effect of acute exercise was measured by Cooper's 12 min run/walk test. Blood samples were collected from each group under four conditions; (I) Before the commencment of Experimentation, (a) before Acute exercise (Cooper's 12 min run/walk), (b) after Acute exercise (Cooper's 12 min run/walk), (II) After the completion of experimentation for nine weeks, (a) before Acute exercise (Cooper's 12 min run/walk), (b) after Acute exercise (Cooper's 12 min run/walk). Tocopherol was estimated by the method of Baker and Frank (1968). Estimation of α – tocopherol was based on the Emmeric Engle reaction (1938). t test, ANOVA and ANCOVA were used to anlyse the data.

**Table 1**

**Experimental Training Schedule**

| Weeks | Target zones | Intensity % of HRmax | Interval Durations | Frequency |
|---|---|---|---|---|
| 1 to 3 | Very light | 50-60% | 20-40 minutes | 3 days/ week |
| 4 to 6 | Light | 60-70% | 40-80 minutes | |
| 7 to 9 | Moderate | 70-80% | 20-40 minutes | |

**Results**

The data on Vitamin E after statistical analysis is presented in Table 2

**Table 2**

**Exercise Induced Changes and the Effect of Training on Vitamin E**

| | Control Group | | Experimental Group | | Sum of Squares | df | Mean Squares | 'F' |
|---|---|---|---|---|---|---|---|---|
| | Before Exe | After Exe | Before Exe | After Exe | | | | |
| Before training | 1.6754 | 1.4433 | 1.6713 | 1.4609 | B: 0.0024 | 1 | 0.0024 | 19.674* |
| Mean Diff | 0.2321<br>t = 79.8367* | | 0.2104<br>t = 38.5946* | | W:0.0022 | 18 | 0.0001 | |
| After training | 1.6762 | 1.4420 | 1.2606 | 1.2311 | B : 0.210 | 1 | 0.210 | 1819.525* |
| Mean Diff | 0.2342<br>t = 76.4679* | | 0.0290<br>t = 6.0206* | | W:0.0021 | 18 | 0.0001 | |
| Adjusted Mean Diff | 0.2342 | | 0.029 | | B:0.099<br>W:0.0020 | 1<br>17 | 0.099<br>0.0001 | 812.839* |

*Significant at 0.05 level. The table value of 'F' required for significance at 0.05 level for df 1 and 18 is 4.41 and df I and 17 is 4.45. Table value of 't' required for significance at 0.05 level for df 9 is 2.26

The level of Vitamin E of the control group at rest before the commencement of training was 1.6754 and that immediately after exercise was 1.4433. The mean difference of 0.2321 was significant at 0.05 level.Hence it is evident that the level of Vitamin E of the control group decreased significantly after exercise. The level of Vitamin E of the experimental group at rest before the commencement of training was 1.6713 and that immediately after exercise was 1.4609. The mean difference of 0.2104 was significant at 0.05 level.Hence it is evident that the level of Vitamin E of the experimental group also decreased significantly after exercise.

Exercise induced reduction in the levels of Vitamin E of te control group and experimental group was further analysed by One way analysis of variance to know whether there was any significant difference between the two groups before training. Te resultant 'F' ratio of 19.674 was significant at 0.05 level. This indicated that significant

difference existed between the control group and experimental group in the level of Vitamin E before te commencement of training.

The level of Vitamin E of the control group at rest after training was 1.6762 and that immediately after exercise was 1.4420. The mean difference of 0.2342 was significant at 0.05 level. The level of Vitamin E of the experimental group at rest after training was 1.2606 and that immediately after exercise was 1.2311. The mean difference of 0.029 was significant at 0.05 level. It is also evident that the rate of decrease in the level of Vitamin E of the experimental group was less pointing to the fact that adaptation has occurred due to training.

When the exercise- induced reduction in the level of Vitamin E of the control and experimental group after training was analysed further using one way analysis of variance, the resultant ‘ F’ ratio of 1819.525 was significant. In order to understand the actual effects of training, analysis of covariance was applied. The adjusted means of control group and experimental groups were 0.2342 and 0.029 respectively with resultant ‘F’ ratio of 812.839. Aalysis of the data indicates that exercise induce oxidative stress in the human body. It also indicates that human body adapts itself against free radical generation with regular aerobic training.

In order to understand wheter adaptation has occurred due to taining the level of Vitamin E at resting state before and after nine weeks of aerobic training were analysed by paired ‘t’ test and te reults are presented in Table 3.

**Table 3**

**Paired t test on Vitamin E of the Experimental Group**

| Experimental group at rest | Before Training | After Training | Mean difference | ‘t’ |
|---|---|---|---|---|
| | 1.672 | 1.259 | 0.413 | 41.74* |

*Significant at 0.05 level (> 2.26)

The table indicates that nine weeks of aerobic training significantly reduced the levels of Vitamin E of the experimental group.

**Discussion**

Exercise induced significant reduction in the levels of Vit. E of control and experimental groups before and after training. Significant reduction in Vit. E levels is indicative of excessive free radical generation over and above the natural antioxidant defence system of the body and hence increase lipid peroxidation. Exercise results in an increase in the production of nuetrophil generated oxygen radicals and cause exercise induced increase in lipid peroxidation ( Davis et.al., Dillard et. al.1978)

The experimental group had significantly reduced level of Vit. E at resting state after nine weeks of training as compared to the resting state Vit E level before training. This indicated that training resulted in the depletion of Vit. E. Exercise induces free radical formation in the muscle and liver resulting in oxidative damage. The amount of damage

depends on exercise intensity, training state and can be reduced by dietary supplementation of Vitamin E ( Witt et. al 1992)

## Conclusion

1. Vitamin E significantly decreased after acute exercise.
2. Nine weeks of aerobic training significantly reduced the Vitamin E levels.
3. Training resulted in the significant reduction of resting state Vitamin E levels.

## Reference


1. Alessio HM, Goldfarb AH, Cutler RG. (1988) MDA Content Increase in Fast and Slow Twitch Skeletal Muscle with Intensity of Exercise in a Rat. ***Am.J.Physiol***.255:C 874-C877.
2. Baker, H.and Frank, O. (1968) **Clinical Vitaminology**, Newyork, Wiley, P.172
3. Davies KJ, Quintanilha AT, Brooks GA, Packer L. (1982) Free Radicals and Tissue Damage produced by Exercise***. Biochem. Biophys.Res.Commun.***107(4):1198-1205.
4. Dillard CJ, Litov RE, Savin WM, Dumelin EE, Tappel AL. (1978) Effects of Exercise, Vitamin E and Ozone on Pulmonary Function and Lipid Peroxidation. ***J.Appl.Physical Respirat.Environ.Exercise Physiol***., 45(6)927-932.
5. Witt EH, Reznick AZ, Viguie CA, Starke-Reed P, Packer L (1992) Exercise, Oxidative Damage and Effects of Antioxidant Manipulation. ***J.Nutr.,*** 122(3 Suppl) 766-73.