

## Determine the effect of aloe Vera and aerobic exercise on lactate de-hydrogenase in male athletes

Amir Hosein Barati\*, Fereshteh Shahidi, Mehdi Lotfipour

*Sport Physiology Dept., Shahid Rajaei Teacher Training University, Tehran, I.R. Iran.*

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### ABSTRACT

**Background and aims:** Aloe vera is a medicinal plant with antioxidant activity. The aim of this study was to determine the effect of Aloe Vera on lactate de-hydrogenase after a period of aerobic exercise in male athletes.

**Methods:** In this clinical trial study, 20 male students with average weight of  $64.85 \pm 51$  and height of  $172.05 \pm 6.4$  were randomly assigned to 2 groups of Aloe vera supplement ( $n=10$ ) and placebo ( $n=10$ ). Then aerobic training was conducted for 4 weeks. Then aerobic training was conducted for 4 weeks. In the supplemented group, they were taking 3 capsules, each capsule contains 2 grams of dried Aloe Vera and placebo group were taking 3 capsules containing Dextrin daily after every meal. To determine the index of cell injury marker lactate dehydrogenase (LDH) was determined and blood samples were collected 24 hours before and after each test. The data were analyzed using ANOVA and independent t-test. Significance level was considered as  $P \leq 0.05$ .

**Results:** The findings of this study showed that Aloe Vera caused a significant reduction of lactate de-hydrogenase ( $p < 0.001$ ). The obtained results of research showed that there were no significant differences in the amount of lactate de-hydrogenase (LDH) after doing the exercise protocol.

**Conclusion:** The findings of this study showed that Aloe Vera reduces lactate de-hydrogenase. This result may reflect the role of Aloe Vera as an anti-inflammatory and antioxidant effect.

**Keywords:** Aloe Vera, Lactate de-hydrogenase, Antioxidant, Boys, Athletic.

Original article

### INTRODUCTION

Since ancient times, medicinal plants have been considered as valuable sources of medicine and some texts in ancient books point to the topic. Nowadays, the extensive use of medicinal plants and their derived compounds has also an important position.<sup>1-3</sup> The skill levels of athletes have been developed in various disciplines. Each factor that can make little chance for developing the success has a special importance that among them, dietary supplements have most important situation.<sup>4,5</sup>

High levels of free radicals and depletion of antioxidants can lead to cellular dysfunction and oxidative damage to membrane lipids and other organelles.<sup>5,6</sup> Reactive oxygen species (ROS) are produced in prolonged and intense exercises that may cause cell damage.<sup>5</sup> It seems that using the antioxidant supplements can decrease the oxidative stress of exercises.<sup>5,7,8</sup> The antioxidant supplements that are introduced to the athletes are mainly synthetic chemical compounds. But today, attention has been paid to the herbal

\*Corresponding author: Sport Physiology Dept., Shahid Rajaei Teacher Training University, Tehran, I.R. Iran, Tel: 00989131853224, E-mail: ahbarati20@gmail.com

supplements with antioxidant activity.<sup>1,5,9,10</sup> Basically, natural supplements have less harms than artificial supplements & against artificial supplements. Aloe Vera is rich in vitamin C and E with antioxidant activity and enhances the resistance of the body against free radicals.<sup>1,9</sup> Aloe Vera works by inhibiting the production of interleukin (IL) 6 and 8 and decreasing leukocyte adhesion.<sup>11,12</sup> It also increases the level of interleukin 10 and reduces the levels of tumor necrosis factor-alpha (TNF  $\alpha$ ), inhabiting the inflammatory reactions.<sup>11,13,14</sup> This study was designed to determine the effect of Aloe Vera on lactate de-hydrogenase after a period of aerobic exercise in male athletes. The factors evaluated were lactate de-hydrogenase (LDH).

## METHODS

This study was a quasi-experimental trial. The population included male athletes of 15 to 18 years old from Imam Ali Industrial and Physical Education School of Shahrekord, Iran. 20 volunteers were divided into 2 groups of Aloe Vera supplementation (n= 10) and placebo (n= 10) groups. The criteria for entering the research included: having general physical and mental health and being athlete. The criteria of eliminating the research were: cardiovascular disease, surgery, hormonal disorders, smoking and any intervention affecting on the experimental results. Before the intervention, in order to homogenize the two groups the age, height, weight and body mass index (BMI) were matched among them. All participants were given written information about research and after studying their parents' consents were gotten.

This research was conducted by a sport physiologist the subjects did not have any history of cardiovascular diseases, high blood pressure, diabetes, kidney and liver

diseases affecting the measured variables. Subjects became familiar with the manner of exercise, for decreasing some of the confounding and bias factors which might affect the results. The subjects were asked to avoid the use of anti-inflammatory drugs during the exercises. Students' cooper tests were done to confirm that they were athletes.

All subjects were healthy and did not have any clear diseases. Blood specimens of subjects were collected in 4 steps as follows: 24 hours before Cooper test (first step), 24 hours after Cooper test (second step), 24 hours before second Cooper test (third step), and 24 hours after second Cooper test (forth step). Two groups participated in the exercise protocol. The intensity of the exercise was increasing once during 4 weeks from simple to hard. Each group had 12 sections for 1 hour and two groups had 15 minutes exercise for warming up, 35 minutes for running with 65%-75% of maximum of heart beats and 10 minutes for cooling off. Also relating to the intense of exercise, this work was done by determining the subjects' heartbeats before exercising, during it and after doing activity in each section. The weight of the athletes was measured by scale with 0.1 Kg accuracy. BMI was obtained by weight (Kg) divided to square of height (meter). Each of bloodletting was done at 16:00 in the supine situation for determining the amount of lactate de-hydrogenase. The blood samples were centrifuge for 5 minutes in 4000 rpm and the serum was separated. The obtained data were presented as frequency, mean and standard deviation for each variable. Kolmogorov-Smirnov test was used to determine the homogeneity of the data. Independent t-test was used for comparing the variables of two groups and IFN Boone to separate mean comparison. The statistical calculation was done by SPSS software

version 16 and the P-value  $P \leq 0.05$  was considered statistically significant.

## RESULTS

The demographic characteristics of the subjects including the age, height, weight and BMI are summarized in Table 1. There were no differences for the above mentioned variables between 2 groups.

The results of repeated measure ANOVA for comparison internal of group

variables in different steps of exercises are presented. Comparison of the effects of inter-group LDH variables in different steps following the use of Aloe Vera, and using statistical tests LDH shows that there was a significant relationship ( $P < 0.001$ ) with coefficient of 6.086 and freedom rate of 3.

The results of independent t-test for comparing LDH in two groups; supplement and placebo are presented in Table 2.

**Table 1:** Homogeneity of the demographic characteristics of the subjects before the exercise

Variables	Supplementation group	Placebo group	P
Age (year)	17±0.65	17±0.94	1
Weight (Kg)	64.80±5.26	64.90±9.75	0.97
Height (Cm)	173.3±5.05	171.06±6.80	0.53
BMI (Kg/m <sup>2</sup> )	21.73±1.84	22.22±3.12	0.67

**Table 2:** Independent t-test for comparing LDH in two groups; supplement and placebo

Indexes and steps		Subjects		The results of independent t-test
Variable	Steps	Supplement group	Placebo group	P-value
		M±SD	M±SD	
	Before the Cooper test	357.60±40.61	376.10±44.77	0.34
	After the Cooper test	394.90±80.48	380.20±32.88	0.59
LDH	After one month, before the Copper test	427.60±94.64	599.80±14.53	0.006*
	After the second Cooper test	495.70±59.138	624.70±59.138	0.01*

\*: *There is meaningful.*

## DISCUSSION

The goal of doing this research was determining the effect of Aloe Vera on lactate de-hydrogenase after a period of aerobic exercise in male athletes. The obtained results of research showed that there were no significant differences in the amount of lactate de-hydrogenase (LDH)

after doing the exercise protocol. The obtained results in agreement with the results of Kan et al and Brier et al.<sup>1,2</sup>

Intense exercise courses such as aerobics or endurance marathon are important factors in the production of free radicals and also production of destructive

factors in membrane. The Cooper test which was used in this research showed that LDH, increased after 24 hours that in comparison between supplemented and placebo groups was significant. The results showed decrease in LDH, which are in agreement with the results of others.<sup>1,5,8,13</sup> In a study, the cellular inflammation index in Aloe Vera group significantly reduced in comparison to placebo group. As it was considered, there are different results about the effects of Aloe Vera in LDH and aerobic exercises in researches.

The number of participants and duration of supplementation to achieve corollary results are important issues. The results of some researches are different following using Aloe Vera supplement.

The level of the readiness and the kind of exercise programs were so effective on the results of it. In this research, all the subjects were male athletes 15-18 years old and the exercise was aerobic exercise with certain intense that all subjects in two groups did for 4 weeks in 3 courses.

In short, the results of statistical analysis of present research showed that using Aloe Vera has positive effect on the antioxidant defense system and also causes a decrease in the free radical during the endurance. So the sport can be considered as a profit in intense exercise.

## CONCLUSION

In response to aerobic exercise, reactive oxygen species are produced that can lead to oxidative damage and inflammatory response stimulates that skeletal muscle damage. Free radical production during exercise causes the muscle cell membrane permeability change as well.

The results show that the use of Aloe Vera can be significantly decreased LDH. The use of this supplement is reduced cellular inflammation indicators. On the other hand, the survey results showed that

the use of different cyclical Aloe Vera supplements have different effects depending on the dose that has a depressing effect on serum levels in LDH. So, Aloe Vera has antioxidant properties. Aloe Vera reduces lactate de-hydrogenase. This result may reflect the role of Aloe Vera has anti-inflammatory and antioxidant.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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