

Effects of 12-weeks Aerobic Training along with Vitamin C Supplementation on Vo₂max of Female Students of Nourabad Mamasani Branch Islamic Azad University

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Abstract—the purpose of this research was to study the effects of 12-weeks aerobic training along with vitamin c supplement on Vo₂max of female students: Islamic Azad University Nourabad Mamasani Branch. 45 subjects Islamic Azad University Nourabad Mamasani Branch, with average age of 22.04 ±1.63 yr. Weight of 56.24±8.69 kg and height of 159.90±5.80 cm were randomly selected from volunteers. They were randomly divided in to 3 groups exercise + vitamin c, exercise +placebo and control. Vo₂max were measured by Standard test in all subjects during pre-test. Then, the exercise + vitamin c and exercise + placebo groups took part in & weeks predetermined physical programs, while the members of control group were asked not to take part in any kind of physical training programs during this period. The exercise + vitamin c and exercise + placebo groups used 100mgr vitamin c and placebo respectively, at the beginning of each exercise session. All subjects used regular university's self – service food programs. After 12-weeks research variables were again measured as post – test. Descriptive statistic, 2

WAY- MANOVA, and Toki tests at the significant level of $\alpha = 0.05$ were used to test hypothesizes. There was a significant increase in vo₂max of both exercise + vitamin c group and exercise + placebo group ($\alpha = 0.0001$) the amount of vo₂max did not significantly change after 12- weeks training in control group. There was no significant difference between exercise + vitamin c and exercise + placebo groups. In general, the results of this study revealed that, aerobic training is the most effective factor in increasing vo₂max, but at the same time, vitamin c supplementation can also help to more increment of vo₂max. So athletes are recommended to carry on more regular aerobic training in order to improve aerobic power and not to be too much dependent on vitamin c supplementation.

Keywords--- Aerobic training, vitamin c, vo₂max.

I. INTRODUCTION

INDIVIDUALS who regularly exercise are more hearty than un-athlete persons .Athletes are less affected by diseases such as high blood pressure ,cardiovascular diseases ,diabetes and cancer .

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Usually, they have longer life and during life they feel joy and happiness and they are more youthful and they live more in youth periods. Regular exercise increases the body demand for energy and mineral materials. Also, it accelerates metabolism and mechanism of repulsion. Sufficient and suitable nourishment help to the improvement of performance and prevent from damage of bone and muscle. One daily meal is composed of a mixture of high amounts of carbohydrate, little amount of fat and mean amount of protein. Also, providing of vitamins and mineral materials at least according to recommended RDA is necessary.

Today, use of vitamin us supplements like other supplements by a athletes is very common. million dollars of vitamin us supplements are sold in world annually and this is a cause for gathering and analysis of findings about value and validity OF excessive development of these materials .Among soluble vitamins in water we can point to vitamin c which is today important not only because of its important role in protection of bony and cartilaginous tissues but because of its important effect in muscular metabolism .Anyway ,we can say that the relation of vitamins with athletic activities is not separate from the role of carbohydrates ,fats and proteins in athletic activities. Vitamins c, B6, B12 and folic acid are effective in generation and increase of hemoglobin.

Accordingly, they make an athlete more ready in endurance activities which need enough oxygen for activity and they improve their efficiency .Also, some of experts believe that use of some vitamins such as vitamin E and C result in tolerance and perseverance in athletes and prevent from fatigue in them.

For example, packer tells: empirically there this conception that vitamins have a surprising influence in athletic competitions, so use of vitamins among athletes has propagated and consumption of supplements is only for increase of their operation.

In another study that is performed by shepherd, it was observed that %75 of university athletes believe that their needs to vitamins is more than UN athletes. In spite of determination of enough meal diet for athletes, some of them feel that they need to vitamin us supplements and mineral materials. Zeeman in his research shows that between 35 to80 percent of athletes based on a special order use from vitamin us supplements and mineral materials.

Accomplished studies during world war II have revealed

this matter that absorption of in sufficient amounts of vitamin c result in decline of body activity during exercises and increase of fatigue and muscular contusion next researches show that these effects will disappear after consumption of 200mlg vitamin c in day .

Rahimi in his research has expressed that with consumption of suitable amounts of vitamin c, we can have more store of liver glycogen that finally result in less creation of lactic Acid during endurance activities and during store term exhaustive activities.

Chen and his call a guest express that increase of ascorbic acid of plasma which has a meaningful correlation with increase of plasma cortisol is as result of exercise that might be along with release of cortisol and cause in release of ascorbic Acid from upper renal gland or from other organs into blood.

Some of researches have shown that increase in efficiency might be attributed to adjustment of lack of vitamin c. we must point to other important aspects of consumption of vitamin c supplement. Vitamin c used for prevention of some signs of extravagance in exercise.

However, some researches show that consumption of vitamin e and c supplements with concentrations of 500 or 100 mg doesn't decrease the structural and bio chemical factors of muscular damage in experienced marathon runners.

One of the factors that is considered in relation to successful performance of perseverance activities is maximum oxygen that can be carried to active muscle and consume by them.

Knowing the amount of vo2 max or aerobic power is a key for maximizing of practice perseverance.

Vo2max of woman is 15-30 percent less than men and this is because of difference in the weight of men and women. With a one by one comparison, the differences will become greater .difference between vo2max of men and women in youth ages are very insignificant and in the ages after growth this difference is completely evident. How all and kroners expressed that the consumption of vitamin c for athletes with purpose of help to release of oxygen in tissues for declining of oxygen debt and also for increase of perseverance is recommended.

After consumption of a meal diet with limitation of vitamin c, the concentration of ascorbic acid decreased. Providing of a limited amount of vitamin c doesn't have any meaningful effects on vo2max and lactic acid in healthy participants.

Anyway, other accomplished studies didn't have shown the great effect of consumption of vitamin c supplement on vo2max, lactate threshold or heart beats in participants who have suitable meal.

In the study of Bu zing and his colleagues on the school children between 12-15 ages, a meaningful statistical relation between operational capacity and condition of meal indicators revealed and one diet of vitamin c supplement show little increase in vo2max.

It seems from results that increase in vo2max had been accompanies with increase of plasma vitamin c and blood hemoglobin. Garry measured the plasmatic levels of vitamin A, L before and after running 24 kilometers marathon.

Plasmatic concentrations of vitamin c at the end of race had been meaningfully higher than the beginning of race while

there wasn't any meaningful difference in the plasmatic concentrations of vitamin A.

About this same discussion, kern and his colleagues evaluate the effect of 21 days consumption of high amount of vitamin c supplement on the increase of aerobic and anaerobic operation. 33 inactive men participate in a physical practice which had been involved of running and walking. The results show a meaningful increase in vo2max didn't prove any increase in anaerobic capacity. But Samantha and her colleagues studied the effect of vitamin us supplement on the cardio respiratory endurance capacity.

In this research, 16 healthy and adult women from physical education section have participated and they have been divided to an experiment group and a control group. Analysis shows that vitamin c supplement can have a meaningful effect on perseverance running capacity of women.

Anyway, many contradictory findings about the effect of vitamins on physical operation exist and many researchers throughout the world intend to determine the real need of individuals to vitamin us supplements.

So , because of the lack of such researches in our country , we tried to know if vitamin c can increase the physical operation ability ?it seems that for revealing of this question , probably the correct response to some ambiguities is necessary and it is necessary to perform studies in this field .

Now, this research intends to study the effect of 8weeks aerobic exercises along with consumption of vitamin c on vo2 max girl students of Nourabad Azad Islamic University. It is hoped that this research can be a pace for more relation of sport and health.

II. RESEARCH METHODOLOGY

This research is a kind of semi-empirical and practical research. statistical society in this research is composed of 2750 girl students of Noorabad Azad Islamic university that 300 persons of them were volunteer for participating in exercises and among them , 45 persons in the age range of 22/04+ 1/63 were selected .

Then these persons have been set accidentally in 3 groups. First group was considered as practice group + vitamin c, second group was considered as practice group + substitute grog and third group was considered as control group. First and second group perform aerobic exercises and at beginning of each exercise they consume 100 mg of vitamins c and substitute drug.

It is necessary to note that substitute drug is made of a mixture of ACID, lactic and acid citric in laboratory and they method of drug consumption was so that participants didn't have any information about the kind of consumed drug.

In two stages of pre-test and post-test , various measurements performed based on the purpose of research and these testes had been involved Riming –Standard step test for estimation of vo2 max , measurement of height , weight and heard beats . Descriptive characteristic of individuals is given in table I.

TABLE I
DESCRIPTIVE INFORMATION OF PARTICIPANTS IN RESEARCH

variable	Average in pre-test	Standard Deviation	Average in post-test	Standard Deviation	Number
Height	159.90	5.80	-	-	45
Age	22.06	1.68	-	-	45
Weight	56.24	8.69	56.05	8.50	45
Heart Beats (HR/min)	163.64	95.72	142.04	17.11	45
Vo2max ML/kg/min	38.07	10.44	46.44	9.65	45

In this research, after selection of sample and various and after taking commitment from them according to pre-selected program.. They said to all of participants that in a certain day hour are present in the sport saloon of university for performing of experiments before exercise or before tests. For measuring of weight, they used digital scales and for measuring of height, they used a fixed tape meter and a scaled ruler. The riming –standard step test was performed by researcher for estimating of vo2max and with the use of timer, step, meter and metronome. After performing of pre-test stage and after achieving of necessary information, the main plan of research was started that is execution of aerobic exercises along with consumption of vitamins c and drug for 12weeks.

Also, they said to the control group that during this period doesn't have any regular or irregular athletic program. For similarity of sample in the light of meal diet, they asked that participants only use the foods of university self- service.

III. METHOD OF MEASURING THE AEROBIC POWER

For measurement of aerobic power, the Standard step test and adjusted hologram of Riming –Standard were used.

At first, the participants warmed their body for 10-15 minutes and they were be justifies with the method of execution of test. The test was executes with going up and sown of a bench (with height of 40cm) and this test was executes in 3minutes.

In this protocol, women worked with the rhythm of 22 strokes of metronome and the stroke of paces was according to the rhythm of metronome. After the end of test, participant stay in stand up position and during a rest period of 15 second the piles frequency of lethargic artery was counted. Then the achieved number is multiply by 4and so the heart rhythm (HR) in 1 minute achieved. Then with setting of HR in left column of monogram and the weight of participant in right column and by connecting of two determined points to each other, the aerobic power was estimated.

It is necessary to note that for performing of this test. At first the participant set her right leg on the stair and then she raise the left leg and in continuation at the time of coming down. She brings sown right leg at first and then the left leg.

The method of performing exercise:

The program of exercise within a period of 8weeks at Bahman and Esfand 1389 was performed in the phase of 3 sessions at week and each session last one hour. Practice group + vitamins c and practice group + drug exercised at afternoon

from 4 to 6.

The intensity of aerobic exercises was 65-75 percent of maximum heart beats that the following formula was used:

Maximum heart beats =220-age

In each exercise session , at warming stage , 5 minutes of soft and light running and 5 minutes of static tensional movements and then 5 minutes of soft and slow movements with s short term rest between movements were performed .

After warning stage, participants run 15 minutes with the intensity of 65-75 percent of maximum heart beats and then they had active rest for 3minutes. In the cooling stage, they run 4 minutes with intensity of 35-45 percent of maximum heart beats and then they performed tensional and slow soft movements for 3 minutes.

In this investigation for analysis of gathered information's, the methods of descriptive statistics have been used, and for comparison of pre-test and post –test of groups, the correlated –t test has been used. Also, for comparison of group, the mutual variance analysis has been used. Therefore pursuit, the tokay-test was used .all of statistical operations were performed with the use of SPSS software at the meaningful level of $\alpha=5\%$. Also, for drawing of graphs the Excel software 2003 was used.

IV. FINDING OF RESEARCH

In comparison of vo2max with attention to means and $p<5\%$, before and after 12 weeks of aerobic exercises , there isn't any meaningful difference in practice group + vitamins c and practice group +drug . so , 8weeks of aerobic exercises have had effect on vo2max of two empirical group and have resulted in improvements of it .With attention to table 2.

TABLE II
CORRELATED T-TEST FOR COMPARISON OF PRE-TEST AND POST-TEST OF VO2MAX IN EMPIRICAL AND CONTROL GROUPS

vo2max before and after	Mean	Standard Deviation	Standard Error of mean	T	Freedom Degree	Level of meaning punctual
Practice Group + vitamin C	158.48	6.22	1.60	-9.63	14	0.0001
Practice Group + drug	-12.10	10.07	2.60	-4.65	14	0.0001
Control Group	2.45	14.46	3.73	0.658	14	0.521

In comparison of vo2max mean, there hasn't been observed any meaningful change in control group after 8 weeks of aerobic exercises.

Also, in comparison of various groups, this result is a achieved that there is a meaningful difference in both inside and between group.

In the light of vo2max Average in post –lest, there isn't any meaningful difference between practice group + vitamins c and practice group + drug. Although this average is a little more in practice group + vitamins c but this difference is not meaningful statistically.

Also, in the light of vo2max Average in post-test, there is a meaningful difference between practice groups + vitamins c control groups and practice group + drug 8 control group as table 3.

TABLE III
TOKAY TEST ABOUT MEAN DIFFERENCE OF POST-TEST OF GROUPS IN THE LIGHT OF V02MAX

Dependent variable	Groups	Groups	Mean Difference	Standard Error	Level of punctual
V02max after test	Practice + vitamin C	Practice + drug	2.724	2.987	0.367
		Control	12.469	2.987	0.0001
	Practice + drug	Practice + vitamin C	-2.724	2.987	0.367
		Control	9.742	2.987	0.002

V. DISCUSSION AND CONCLUSION

About the effect of 12 weeks consumption of vitamins c supplement along with aerobic exercises on the vo2max of 45 students in 3 groups, it was observed that the average of vo2max in practice group +vitamins c and practice group + drug has increased after the end of period and in the post –test stage. And this increase was not meaningful statistically but in practice group + vitamins c this increase was more than practice group +drug.

Also, with comparison of vo2max averages in 3 groups, it was observed that after 8weeks, this Average in practice group is meaningfully more than control group.

But there wasn't any meaningful difference between two empirical groups. Also, results show that vo2max of control group didn't have any meaningful change. Anyway the present research show that consumption of 100mlg vitamins c for 12 weeks along with aerobic exercises results in meaningful increase in vo2max. Although , in drug group , a meaningful increase has been appeared but because this increase is more in vitamins c group , we can conclude that vitamins c supplement has resulted in a little and un meaningful increase in vo2max .

The results of this present research is similar to the results of molehill (1378) and buzzing and his colleagues , on the other hand , the results of this research don't have any coordination with findings of some executed research in this field . for example , about this same discussion , kern and his colleagues estimated the effect of 21 days consumption of high amount of vitamins c supplement on the increase of aerobic and anaerobic operation , 33 active men participated in a period of physical practice that was including running and walking .

The results of this research show a meaningful increase in vo2max that is inconsistent with results of present research. Perhaps, the cause of this contrary is that in research of kern very high doses of vitamin c had been used while in present research, the consumption doses of vitamin c was 100 mg.

About this matter, substance and his colleagues studied the effect of Acid ascorbic supplement on operational capacity of 49 adolescent boys. After two months of daily consumption of

70 mg acid ascorbic, the average plasmatic levels of vitamin c in experiment group increase from 0/33 to 1/79 mg and cumin shortage amount of vitamin c in plasma decrease from 0/52 to zero. With improvement in biochemical condition of vitamin c, a meaningful increase in vo2max was observed. although , it seems that the result of substance research is not similar to the result of present research but it must be attended that in his research about child's who had lack of vitamin c , as result of consumption of supplement , this vitamin has increased but this increase in healthy persons was not meaningful .

Anyway, as it was observed the achieved results from various researches about the effect of vitamin c supplement and its influence on vo2max are very ambiguous and in various studies, contradictory results have been achieved. Also, the influence of this supplements on the other operational indicators of human and animals is studied. for example , in a research that marshal has performed on greyhounds , he found that with consumption of vitamin c supplement in amount of 1 gram before practice and 1gram after practice , the speed of greyhounds will decrease .

On the other hand, packer and his colleagues with declining of vitamin c in meal diet of Indian pigs observed the decrease and deficit in the running operation of pigs.

What we must note about the contradictions is that most of up researches had been a kind of field researches and a few researches have been performed in experimental controlled conditions , Also , age , sex , consumption does , kind of practices , consumption duration , consumption time , type of test and meal diet are other probable factors that have results in various researches .

Other important factor that might have weekend the influence of consumption of vitamin c supplement in present research is performing of aerobic exercises.

Various researches have shown that performing of aerobic exercises result in increase of vo2max. It is evident that with increase of duration and intensity of exercise, the need to oxygen increase also but physiologic capacity of human body for delivering oxygen to tissues is limited and this capacity is different in various people. This capacity (vo2max) in athletes had been higher than usual people and endurance athletes have the highest amount of vo2max. Increase of mitochondria activity and increase of enzymatic activities is the effects result for exercise that cause in increase of vo2max. Also the type of used test for evaluation of vo2max had been effective in achieving of inconsistent results in various researches.

Astern step - test that was used in present research is an indirect method for evaluation of vo2max and although it has high validity but it is possible that the results of it have been different from achieved results of direct tests. So, with attention to these findings, it is not possible to express decisive idea about the effect of vitamin c on physical operation and vo2max. It needs more researches.

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