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The Role of Antioxidant Supplementations in Female Sports Person

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Abstract

Diet significantly influences athletic performance. Today the Competitive sports man has been made aware of the important role that nutrition can play in both training as well as competition, for there is clear evidence to show that improved eating habits not only benefit health but also influence an individual's endurance and capacity to perform exercise. Deficiencies of many of the nutrients are known to adversely affect exercise performance. Exercise causes oxidative stress, a type of stress caused by exposure to oxygen. Athletes may have a higher need for antioxidant nutrients. Athletes should make sure they get the recommended daily allowance for vitamins Beta Carotene, C and E as well as the mineral Selenium. The sports person of 102 numbers of students was in the age group of 18-21 years were analyzed. A good nutritional management must have adequate nutrients in terms of energy, protein, vitamins and minerals according to the Individuals needs along with fluid and electrolyte.

Keywords: Anti Oxidant, Competitive Sports Person, Beta Carotene, Vitamin C & E, Selenium.

Introduction

Maintaining a healthy diet is essential for both athletic performance and fitness. The nutritional needs of athletes and less active individuals are comparable. Generally speaking, athletes require more water and energy than non-athletes. A lifetime of healthy eating practices has a greater impact on optimal athletic performance than using or avoiding certain foods. However, a healthy diet can be enough to give you the "Competitive edge."

Much research has recently focused on new antioxidant vitamins may reduce cardiovascular disease risk. Anti oxidant vitamins-E, C and Beta carotene have potential health-promoting properties.

There is growing evidence that acute exhaustive exercise and training exercise induce the need for antioxidant vitamins. Vitamins neutralize several oxygen species and also play a major role in exercise induced oxidative stress(Power et al., 2004). Vitamin defiency cause an increase in hidh reactive oxygen molecules and cause oxidative damage(Ji i et al., 1999).

The scope of the present study was carried out to prove the role and need of antioxidant supplementations in female sports person.

Review

Athletes in training generally use 12-20 times more oxygen than people with sedentary life styles. This extra use of oxygen increase free radical production and oxidative damage, therefore exercising without nutritional protection is downright unhealthy. Increasing the body's protective reserve of nutrient antioxidants by supplementation, minimizes the destruction of cellular membranes, reduces muscular damage during intense training and facilities recovery.

Dietary antioxidants such as ascorbic acid (vitamin C), beta carotene and Carotenoids, and the tocopherols and tocotrienols (vitamin E) are suggested as having protective roles against carcinogenesis. (Sauberlich 1994).

To prevent exercise-induced oxidative stress, the organism is well equipped with antioxidant defense system with high-energy intakes. Antioxidant supplementation has a favorable effect on LIPOX process in highly trained athletes or in overloaded athletes and prevents marginal status of vitamin C in professional basketball players (Miyazaki er al., 2001).

Reactive Oxygen Species (ROS) are free radicals that contain the oxygen atom. They are very small molecules that include oxygen ions and peroxides can be either inorganic or organic. They are highly reactive due to the presence of unpaired valence shell electrons, ROS form as a natural byproduct of the normal metabolism of oxygen and have important roles in cell signaling.

During environmental stress (e.g. UV or heat exposure) ROS levels can increase dramatically, which can result in significant damage to cell structures. This cumulates into a situation known as Oxidative stress/ROS are also generated by exogenous sources such as ionizing radiation. The Reactive Oxygen Species produced in cells include hydrogen peroxide (H□O□), hypochlorous acid (HOCI), and free radicals such as the hydroxyl radical (OH) and the superoxide anion (O2) (Miyazaki et al., 2001).

Vigorous exercise executed by healthy individuals can increase opioid peptides, increase testosterone an growth hormone. Both aerobic and anaerobic exercise increases the mechanical effiency of the heart by increasing cardiac volume (Burfoot et al., 2004).

Harmful effects of Reactive Oxygen Species on the cell are most often,

- Damage of DNA
- Oxidation of polydesaturated fatty acids in lipids (lipid peroxidation)
- Oxidation of amino acids in proteins)

Antioxidants may be classified into two types. They are Enyzmatic antioxidants and Non enzymatic antioxidants. There are numerous small molecules that function as non-enzymatic antioxidants. They are Vitamin A, Vitamin C, Vitamin E, Bilirubin, Uric acid, Flavonoids, Carotenoids. Of these non enzymatic antioxidants Vitamin A, C and E are of clinical importance Vitamin is an organic compound required as a nutrientin tiny amounts by an organism (Bellis et al., 2005).

Common provitamins carotenoids found in foods that come from plants are beta- carotene, alpha-carotene, and beta-cryptoxanthin. Among these, beta-carotene is most efficiently made into retinol. Alpha-carotene and beta-cryptoxanthin are also converted to vitamin A, but only half as efficiently as beta-carotene (Sol omens et al., 2003).

Ascorbic acid is well known for its antioxidant activity. Ascorbate acts as a reducing agent to reverse oxidation in aqueous solution. When there are more free radicals (Reactive Oxygen Species) in the human body than antioxidants, the condition is called oxidative stress. (McGregor et al, 2006).

Vitamin E is a fat soluble antioxidant that stops the production of reactive oxygen species formed when fat undergoes oxidation. -tocopherol is the most important lipid-soluble antioxidant. Particularly high levels of vitamin E can be found in the following foods Asparagus, Avocado,

Egg. Milk, Nuts, such as almonds or hazelnuts, Seeds, Spinach and other green leafy vegetables (2mg - 13%), Unheated vegetable oils, Wheat germ, Wholegrain foods. The Vitamin E are of two types. They are a-Tocopherol and Gamma Tocotrienol (Smedts et al., 2009).

Protein intake is a part of the nutrient requirements for the regular athlete and is an important component of exercise training, because it can also aid in performance and recovery. Dietary protein intake for well-trained athletes should before, during and after physical activity as it is advantageous in gaining muscle mass and strength. (Campbell et al., 2007).

Materials and Methods

Role of antioxidants supplementation in female sports persons were considered for the present study

Experimental Design

The sports person of 102 numbers of Seethalakshmi Ramaswami College students were selected for the present study. The students were in the age group of 18-21 years who were actively doing their regular practice and taking part in group events. A structured questionnaire was used to record the demographic features like age height, weight and the sports events they participate.

The Selected Group was Divided as Follows

Group 1-control (not supplemented with vitamin A, C & E source) (n-51)
Group 2-100 gram of papaya/day was supplemented to them as vitamin A source. (n-17)
Group 3- 100 gram of guava/day was supplemented to them as vitamin C source (n-17)
Group 4-20 gram of groundnut/day was supplemented to them as vitamin E source. (n-17)

Collection of Blood Sample

5 ml of blood samples was collected from each one before supplementation and after supplementation with three antioxidant nutrient sources for a period of 90 days. EDTA was used as the anticoagulant. The serum was separated after allowing the blood to retract and separated by using centrifuge at 3000 rpm for 15 minutes and the sample was used for further analysis. The collected sample was subjected to analyze vitamin A, C and E and antioxidants enzymes like superoxide dismutase, catalase also protein and cholesterol estimation. Phytochemical screening was done from the three vitamin sources.

The collected samples were subjected for the following estimation

Biochemical Analysis

Vitamin A, Vitamin C, Vitamin E, Super oxide dismutase, Catalase, Protein, Cholesterol

Results and Discussion

Vitamin supplementation and phytochemical screening were studied in sports person. About 102 female sports students in the age group of 18-21 years were analyzed. An attempt has been made to study the role of antioxidants supplementations in female sports person. The obtained results were discussed below,

Table 1 represented the anthropometric measures of the sample. Among the test group of 18.6 years old athletes are found to be shorter than 18.5 year old girls. On the other hand the weight of 17.6 year old athletes is heavier than the 18.5 and 18 year female athletes

Table 1 Anthropometric Measurements of Female Sports Persons

Group	Mean Age of Sample (yrs)	Sample Size (102)	Mean Hgt of sample (Ft)	S.D of Height	Mean wgt of sample (Kg)	S.D of Weight	Events
I	18.5	51	5.45	+ 0.22	50.4	+ 5.46	Netball Kho-Kho Volleyball
II	18.6	17	5.04	+ 0.59	47.6	+ 7.09	Kho-Kho
III	18	17	5.02	+ 0.21	41.6	+ 5.24	Volleyball
IV	17.6	17	5	+ 0.32	54.2	+ 1.37	Netball

The preliminary phytochemical screening of primary metabolites for Papaya, Guava, and groundnut has been depicted in Table 2. From the result it is revealed that papaya and Guava answered for the presence of carbohydrates, phenols and absence for amino acids. Groundnuts not respond for carbohydrates and amino acid test.

Fruits, vegetables and nuts contain large amount of Vitamin C, Vitamin A. vitamin E, and other phytoconstituents such as flavonoids. These nutrients prevent or diminish degenerative diseases associated with ROS (Antonio et al: 1999).

Table 2 Preliminary Phytochemical Screening of Primary Metabolites

S.No	Phyto Constituents	Papaya	Guava	Groundnut
1	Amino acid	-ve	-ve	-ve
2	Carbohydrates	+ve	+ve	-ve
3	Phenols	+ve	+ve	+ve

+ve : Presence, -ve : Absence.

Results of phytochemical screening of secondary metabolites in vitamin sources were given in Table 3. The results revealed that the papaya extract contains alkaloids, flavonoids triterpenoids, anthraquinones, catechins, saponins and steroids. Guava extract contains alkaloids, flavonoids, triterpenoids, anthraquinones, catechins and Saponins. Groundnuts contain alkaloids, flavonoids, anthraquinones and steroids. Tannins was absent in all three vitamin sources.

Table 3 Phytochemical Screening of Secondary Metabolites

S.No	PhytoConstituents	Papaya	Guava	Groundnut
1	Alkaloids	+ve	+ve	+ve
2	Flavonoids	+ve	+ve	+ve
3	Tannins	- ve	- ve	- ve
4	Triterpenoids	+ve	+ve	- ve
5	Anthraquinones	+ve	+ve	+ve
6	Catechins	+ve	+ve	- ve
7	Saponins	+ve	+ve	- ve
8	Steroids	+ve	- ve	+ve

+ve : Presence, -ve : Absence.

Level of vitamin A was tabulated in Table 4. There was reduction in level of Vitamin A in control group (group In 17) where as the level of vitamin A was markedly increased in the test

group (group II n 17) of sports person who were given vitamin A supplementation (Papaya 100 grams/day) when compared to control group (group 1) Supplementation with papaya increased the level of vitamin A to normal range

Supplementation of diet with papaya gives protection against exercise induced muscle damage since it has the potential to prevent disease associated with free radicals and tissue damage (Ross 1999). RDA of vitamin A for female athletes was 1000 IU/day.

Table 4 Level of Vitamin A in Various Groups

S. No	Group I - Control			Group II - Test		
	Before	After 45 days	After 90 days	Before	After 45 days	After 90 days
1	10.64 ±0.6693	10.16 ±0.6269	10.05 ±0.961	12.5 ±1.592	12.62 ±1.848	12.68 ±1.389
2		*-4.51	**-5.5 ***-1.08		*1.12	**-1.44 ***-2.5

* - comparison between before and after 45 days(%)
** - comparison between after 45 and 90 days (%)
*** - comparison between before and after 90 days(%)
± - Mean and SD

Level of vitamin C in Table 5 shows that before and after supplementation there was significant reduction in level of vitamin C in control group (group 1 n= 17) when compared with the test groups (Group III n 17) the level of vitamin C was slightly increased in sports person who were given vitamin C supplementation (Guava 100 grams/day) to normal range.

In our present study the level of vitamin C in the control study group was significantly decreased after 45 and 90 days of exhaustive training and performance in the sports events when compared to initial period of experimentation. Vitamin C exerts a large scope of important antioxidant activities due to its ability to react with aqueous free radicals and oxygen species. But the level of vitamin C in the test study group was found to be slightly increased which might be due to the supplementation of Guava 100 grams/day thus it prevents the disease associated with free radicals and tissue damage (Margaritis et al., 2003). RDA of vitamin C for female sports person was 40 mg/day.

Table 5 Level of Vitamin C in Various Groups

S. No	Group I - Control			Group II - Test		
	Before	After 45 days	After 90 days	Before	After 45 days	After 90 days
1	3.86±1.4859	3.26±1.479	2.73±1.4724	4.1±0.5552	4.706±0.663	4.87±0.6195
2		*15.5	**28.4 ***15.3		*-14.7	**-8.05 ***-5.03

* - comparison between before and after 45days (%)
** - comparison between after 45 and 90 days (%)
*** - comparison between before and after 90 days (N)
± - Mean and 3D

Table 6 revealed that the value of vitamin E in control and test group. In control group there was one fold reduction in value of vitamin E (group In 17) was observed during 45 and 90 days of experimental period. Where as in test group (group IV n-17) the concentration of Vitamin E was mildly increased for sports persons before and after supplementation. Therefore Supplementation with Groundnut markedly increased the level of vitamin E to normal range.

Table 6 Level of Vitamin E in Various Groups

S. No	Group I - Control			Group II - Test		
	Before	After 45 days	After 90 days	Before	After 45 days	After 90 days
1	2.28±0.7629	.9±0.888	1.84±0.7829	2..78±04438	2.86±0.8471	3.004±0.5685
2		*16.66	**19.2 ***3.15		*2.87	**8.05 ***5.03

* - comparison between before and after 45days (%)
** - comparison between after 45 and 90 days (%)
*** - comparison between before and after 90 days (N)
± - Mean and 3D

Summary

The present study has been carried out to evaluate the role of antioxidant in female athletes. The results are

- Papaya, Guava, Groundnut was screened for the presence of primary and secondary metabolites indicates the presence of carbohydrates, proteins, alkaloids, flavonoids, anthroquinones, catechins, saponins and steroids.
- The level of non-enzymatic antioxidant vitamins such as Vitamin A and Vitamin C were found to be increased slightly in test groups of athletes after 45 and 90 days supplementation compared to control groups Pronounced increase was found in 90 days sample than 45 days.
- The level of Vitamin E was found to be lowered in test groups than control groups.
- The level of SOD and Catalase was found to be increased slightly in all groups except in control group. There was a gradual decrease in before and after supplementation.
- Serum total Cholesterol was found to be increased in 45 days than 90 days due to excessive oxidation of fats compared to control groups.

Conclusion

To fully realize any benefits to sports performance and recovery. supplements need to be used appropriately, Supplements and proper nutrition are important factors in overall sports training program and should be considered in the context of an overall training program designed to maximize performance. It is important that to have a clear understanding of the goals. Then, develop a nutrition and supplemental program that complements those goals.

Exercise will increase reactive oxygen species, which can result in damage to cells. The body contains an elaborate antioxidant defense compounds such as superoxide dismutase, catalase and glutathione and numerous enzymes, they are involved in the quenching or removal of free radicals. These compounds are endogenously produced and depend on dietary intake of antioxidant vitamins and minerals. Hence this study concluded that the supplementation of fruits and nuts might provide the healthy status to people involved in exercise stress and create awareness in youngsters on the dietary importance of vegetables, fruits and nuts.

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