

## The effect of beta-carotene intake on the enzymes GPX and CAT and the offensive performance of advanced boxers

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### Abstract

Boxing training is characterized by high intensity similar to the nature of fight performance, and this causes large accumulations in the levels of lactate salts in the muscle, as well as the appearance of free radicals in the blood, which in turn cause damage and may cause oxidative stress to the boxers, which causes inflammation in the joints and muscles as a result of the intensity of the exercise and fight. Hence, the study aimed to study The research included that the individuals in the research sample take doses of beta-carotene Forest 1.5 mg, 500 IU, in doses specified by the nutritionist for the purpose of stimulating the enzymes responsible for oxidizing electrolytes and free radicals in the blood of advanced boxers at the Hindiyah Sports Club.

The researchers used the two-group experimental approach. The research sample was represented by advanced boxing players at the Hindi Club in Karbala Governorate, who numbered 14 light and medium weight boxers. They were given doses of beta-carotene under the supervision of a specialist doctor, one dose per day (capsule) three hours before training and for 30 days after that, and post-tests were conducted. GOT-CAT enzyme, as well as endurance to offensive performance (straight, side, and upward punches (gouging)). The researchers used the SPSS statistical program to extract the research results, and from them they concluded that beta-carotene antioxidants clearly contributed to reducing the severity of free radicals and their oxidation through high levels of the GOT enzyme. -CAT, as well as its role in raising the level of boxers' endurance in throwing punches. In light of this, the researchers recommend the need to focus on taking antioxidants and proper nutrition for boxers and other sports, under the supervision of a nutritionist.

**Keywords:** Beta carotene , CAT-GPX enzyme , endurance and offensive performance.

### Introduction

The science of training depends heavily on other sciences, including mainly health sciences and nutritional sciences, because of their major role in the safety of players and achieving great training results, especially in high-intensity games, because the player needs to compensate for lost energy sources, as well as reaching excess compensation, which in turn contributes to the process of Development in the body's cells, and the game of boxing is one of the games whose exercises are characterized by relatively high intensity, accompanied by large accumulations of lactate salts and free radicals, so it requires proper nutrition and under the supervision of a specialist doctor, as well as the administration of antioxidants (beta carotene) to oxidize free radicals, which play a major role in chemical reactions in the body.

The game of boxing is one of the games that requires a very great effort, and this prompts those in charge of this sport to choose the appropriate nutrition and nutritional supplements that help the player compensate for the lost calories, and the correct nutrition with antioxidants works to create functional adaptations in the various systems and organs of the body.<sup>1</sup>

Which in turn increases the level of endurance in the offensive performance of boxers hence the importance of research through the use of antioxidants (beta carotene) to activate enzymes that help oxidize free radicals in boxers and support the offensive performance of boxers.

### **Research problem**

Reaching the ability of the athlete to perform physically and skillfully and achieve satisfactory results, and through the researcher's follow-up, he noticed that there is a weakness in the boxers' endurance while throwing punches and offensive performance as a result of weak physical abilities and the rapid appearance of fatigue, which may be the result of free radicals resulting from practicing high-intensity sports activity, which can contribute to muscle fatigue and damage during exercise for long periods. Therefore, in order to reduce this damage resulting from the generation of free radicals, the athlete must eat meals that contain antioxidants or take them through antioxidant nutritional supplements.

### **Research objective**

- Identifying the effect of antioxidants (beta-carotene) on the enzymes GPX and CAT and the endurance of offensive performance in advanced boxers.

### **Research hypothesis**

- Antioxidants (beta-carotene) have an effect on the enzymes GPX and CAT and the offensive performance of advanced boxers.

### **Research field**

- Human field: Advanced Hindi Club boxers in Karbala Governorate 2023 AD
- Time frame: for the period from 4/1/2023 to 5/1/2023.
- Spatial field: Hindi Boxing and Kickbox Club hall and ring. And Indian laboratories for medical analysis).

### **Research Methodology**

The researchers used the experimental method with two equal groups (experimental and control) with a pre- and post-test to suit the nature of the research.

### **The research community and its sample**

The research community was limited to the 14 boxers applying for the Hindi Club for the 2023 season. The sample was divided into two groups (experimental and control), with seven boxers for each group.

**Homogeneity and equality of the two research groups**

**Table 1.** Shows the calculated Levene and t values and the significance level of the researched variables

Variables	Experimental group		Control group		F value	Calculated t value*	Sig	Indication
	mean	Sd	Mean	Sd				
GPX anzem	784.02	22.17	779.23	15.93	1.24	0.46	0.65	Non Sig.
CAT anzem	457.20	13.87	467.12	18.10	0.14	1.15	0.27	Non Sig.
Endurance offensive performance	89.71	2.98	90.28	2.21	0.58	0.40	0.69	Non Sig.

\* At a significance level of (0.05) and a degree of freedom of 12.

It is clear from the previous table that the research variables are random, meaning that there is no difference between the two research groups, and this allows the researcher to work with a clear line for the two research samples.

**Field research procedures**

**Determine search tests**

**Determine the enzymatic measurement of GPX, CAT**

Blood was drawn from the sample members by a specialist in laboratory analysis, at an amount of (5 cc) when performing the measurement before exertion, to analyze the levels of the enzyme glutathione peroxiase (GPX) and catalase in the blood, by placing it in the (Centerfuge) device for 5 minutes. The samples were mixed by continuous shaking and preserved. For 3 minutes at a temperature of 37 degrees Celsius, then the reaction is stopped by adding 0.5 ml of 10% Tri Chloroacetic Acid (T.C.A.) and mixing it using a device by placing it in the (Centerfuge) device for 15 minutes and with a number of cycles of 3000 revolutions/minute, after which 2 ml is taken. Of the clear solution in a new sterile tube, add 3 ml of Na2Hpo4 to each tube (T.S.B.) and 1 ml of DTNB to the tube (T.S.B.). These samples are then read by a spectrophotometer at a wavelength of 412 nm over a period of 3 minutes.<sup>2</sup>

**Attack performance endurance test**

- Description of the performance - From the position of preparation for boxing, and after the start whistle sounds, the boxer begins a round for you on the bag fixed at the top to reduce swaying for a period of 60 seconds, using all types of straight and side punches (hooks) and upward punches (knockouts), taking into account the correct punching conditions, which are (punching with the front of the glove and following the weight). Shoulder for punch and correct coverage while punching.
- Recording method: The number of correct punches is counted within 60 seconds.

**Pretests**

The pre-tests were conducted on Monday, April 3, 2023, and at three o'clock in the afternoon, he began testing the offensive performance endurance by throwing punches on the punching bag for a period of 60 seconds, as stated in the details of the offensive performance endurance test. After that, blood samples were drawn from the boxers to measure the proportions of The GPX and CAT enzymes were extracted after efforts by a specialist in medical laboratory analyzes and then transferred to Indian laboratories to be processed and extract the variables required for study.

**The main experiment**

The doses of antioxidants (beta-carotene), Canadian-made from Forrest, 1.5 mg, 5000 IU, were taken by the research sample about three hours before the training dose. The dose of the antioxidant (beta-carotene) was taken, as the doses were taken before the training units amounting to 4 training units. per week for four weeks, i.e. 16 training units during the experimental month, while the experimental group was not given any antioxidants.

**Post-tests**

The researchers conducted the post-tests for the research sample members on Wednesday, May 3, 2023, taking into account the same conditions and location as the pre-tests.

**Results and discussion**

- **Presentation and analysis of the differences between the pre- and post-tests of the experimental group**

**Table 2.** Shows the values of the pre- and post-tests for the experimental group on the investigated variables

Variables	Pretest		Posttest		Calculated t value	Sig	Indication
	Mean	Sd	Mean	Sd			
GPX anzem	784.02	22.17	844.35	24.94	4.205	0.006	Sig.
CAT anzem	457.20	13.8	538.47	32.365	13.463	0.00	Sig.
Endurance offensive performance	89.71	2.98	115.42	5.59	10.041	0.00	Sig.

\* At a significance level of (0.05) and a degree of freedom of 6.

After presenting the results of the pre- and post-tests to the experimental group, the results showed significant differences for all the research variables. This means that antioxidants have an effect on the measured enzymes, which in turn contribute to the oxidation of free radicals in the blood, and this helps in increasing the endurance of the offensive performance of the boxers, that Antioxidants work to increase concentrations of enzymes (GPX-CAT), which protect cells from free radicals.<sup>3</sup>

- **Presenting and analyzing the differences between the pre- and post-tests of the control group**

**Table 3.** Shows the differences between the pre- and post-tests of the investigated variables

Variables	Pretest		Posttest		Calculated t value	Sig	Indication
	Mean	Sd	Mean	Sd			
GPX anzem	779.23	15.93	789.6	16.64	2.18	0.25	Sig.
CAT anzem	467.12	18.10	481.45	18.7	1.61	1.15	Sig.
Endurance offensive performance	90.28	2.21	97.85	5.55	4.09	0.00	Sig.

\* At a significance level of (0.05) and a degree of freedom of 6.

The results of the tests showed that there was no difference between the pre- and post-tests of the control group for the GOT-CAT enzyme. This means that the research sample of boxers did not eat foods rich in antioxidants, and this helped in the appearance of free radicals in the blood, with the body not responding adequately to the oxidation of free radicals. As for performance endurance, the coach's training has contributed to a change in the players' endurance in throwing punches as a result of continuing training.

- **Presenting, analyzing and discussing the results of the differences between the post-tests of the experimental and control groups**

**Table 4.** Shows the differences between the post-tests of the variables investigated for the two research groups

Variables	Experimental group		The control group		Calculated t value	Sig	Indication
	Mean	Sd	Mean	Sd			
GPX anzem	844.35	24.94	789.60	16.64	4.38	0.00	Sig.
CAT anzem	583.47	32.36	481.45	18.69	7.22	0.01	Sig.
Endurance offensive performance	115.42	5.59	97.85	5.55	5.90	0.00	Sig.

\* At a significance level of (0.05) and a degree of freedom of 12.

Table (4) shows that the value of the significance level (sig) for the investigated variables is less than (0.05). This means that the antioxidants (beta-carotene) have significantly affected the GPX-CAT enzyme, as beta-carotene is one of the cellular antioxidant systems that stimulate The action of enzymes, which work to scavenge the remains of monooxygen and exist in an oxidative or reduced form. These enzymes play an effective role in protecting the body from the effects of free radicals, and this in turn contributes greatly to the oxidation of free radicals resulting from the intensity of exercise and performance during the duration of the fight.<sup>4</sup> “The results of studies indicate that taking antioxidants as a nutritional supplement before training reduces muscle damage resulting from training.”<sup>5</sup> ,“food antioxidants and regular training work to increase antioxidant defenses, especially before training.”<sup>6</sup> the increasing antioxidant defenses by eating food or through nutritional supplements before training reduces muscle damage resulting from training. the antioxidants

are a defense system against oxidation caused by stray oxygen atoms to protect cells. One of the harmful effects of increasing these atoms is that antioxidants consist of some enzymes made by the body in addition to some nutrients that a person eats in his daily meal. Antioxidants work in several ways. They may reduce energy from active oxygen or stop free radicals from oxidizing or a chain of oxidative events to reduce damage. Free radicals. Antioxidants also contribute to increasing muscle endurance by protecting muscle cells from damage resulting from free radicals. Therefore, some of the nutrients that a person eats in his daily food or as antioxidants all work together or individually in several ways against free radicals, and may reduce energy. From active oxygen, stopping free radicals from oxidizing, or interrupting a series of oxidative events to limit the damage of free radicals.<sup>7</sup>

The antioxidant is classified as the substance that has the ability to inhibit free radicals, so a small amount of the antioxidant must be lost by the body. Also, the few antioxidant molecules inside the human body, such as some enzymes, are insufficient. To completely prevent this damage, foods containing antioxidants are important in maintaining health for athletes, especially high-intensity sports.<sup>8</sup>

### **Conclusions**

1. Taking antioxidants (beta carotene) helped increase the concentration of the enzyme (GPX-CAT).
2. Taking beta-carotene contributed to increasing the attack endurance of advanced boxers.

### **Recommendations**

1. The necessity of having a nutritionist for athletes, especially boxers, to compensate for the large amount of energy and effort spent on the body's systems.
2. Emphasis on eating foods rich in antioxidants, as well as nutritional supplements that contain antioxidants.

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