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Original article

THE EFFECT OF BORON SUPPLEMENTATION ON FREE TESTOSTERONE ACTIVITY IN THE BLOOD DURING MUSCLE STRENGTH TRAINING OF VOLLEYBALL PLAYERS

SHARAIF B.[1], AL BUSAFI M.[1], AL KITANI M.[1], NASR ALDEEN N.[1]

Abstract

*Objective***.** Boron is found naturally in the environment, plants absorb it from the soil because it is essential for its growth, and humans achieve it thanks to the consumption of plant-based foods such as fruits and vegetables (The human body contains about 0.7 mg per kilo of boron weight).The aim of this investigation was to explore the effect of boron supplementation on free testosterone activity in the blood during muscle strength training of volleyball players.

Methods. Sixteen volleyball players, Eltayaran club, divided into two groups. The experimental group (n = 8) take boron supplement contains boron mineral salts the boron supplement has been taken in a daily dose (2MG) in the last 4 weeks in the program for the experimental group. In the days that there is no weight training, In the morning after breakfast and in the days when weight training was done, two doses were used in the morning after breakfast and one in the meal, which precedes the training, based on the expert opinion. and control group (n = 8) (placebo) performed traditional exercise. Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

Results. The results showed statistically significant differences:

1. between the experimental group and control group in Free Testosterone After effort for posttest to the experimental group. No Significant Difference Free Testosterone at rest
2. between the experimental group and control group in Leg Static strength, Back Static strength, Vertical Jump, Seated Medicine Ball Throw for posttest to the experimental group

Conclusion. In conclusion, our data suggest that (4) weeks boron supplementation could improvement of Free Testosterone After effort,Leg Static strength, Back Static strength, Vertical Jump, Seated Medicine Ball Throwin volleyball players.

Keywords: boron supplementation, free testosterone, strength, volleyball.

Introduction

The hormonal system is one of the most important organs in the body that respond to the exercise activity, which regulates the rates of chemical activity of different cells and tissues of the body, but the nervous system is characterized by rapid response to changes in the internal environment or external, while the response of the endocrine system is slower but the impact is Deeper and lasts longer. Changes in the activity of these glands are therefore responsible for the response and adaptation of the activity. (JM. Seddon, et al. 1994).

Testosterone is the hormone steroid hormone (a steroid hormone), which is derived from cholesterol (a cluster of androgens) androgen group in the man is producing large amounts of testosterone by means of leading cells (leydig cells) in the testes and a small amount of adrenal gland, increasing the level of hormone Testosterone in puberty causes maturation of the genitals or sperm production and the development of sexual characteristics and characteristics such as facial hair growth, coarseness, and muscle tone. Testosterone continues to rise until the age of 40 and then begins to fall to five times its maximum age (CT. Sempos, et al. 1996).

Natural testosterone levels in blood plasma: -

(K. Häkkinen, et al. 1988) reported that the levels of natural testosterone are as follows:

- In adult males (300-100) mg per deciliter.
- In adult females (30-95) mg per deciliter.
- In males before maturity less than (100) mg per deciliter.
- In females before maturity less than (40) mg for each deciliter. (V. Cinar, et al. 2009).

The function of the hormone is to increase the amount of protein produced in the body Nerprotein synthesis by increasing the conversion of amino acids to proteins and increase the bonds of nitrogen in many tissues, as a result of the effect on the activation of this form of the transgenic carrier DNA-Transcription and increase the composition of

[1]College of Education, Physical Education Department,Sultan Qaboos University, Oman
Email: amr297@aswu.edu.eg
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the) M. RNA is shown more clearly in the muscles and on other tissues such as liver and kidney.

It is also mentioned that structural effects increase the formation of red blood cells as well as stimulate bone growth by activating the secretion of growth hormone (GH). The hormones act together to stimulate bone growth, which is responsible for the rapid increase in growth.

Athletes always look for what they can compete and help them to do their best. It is obvious that the best and most effective way to develop natural athletic abilities is through good training and ideal nutrition together. "To achieve the best results from the training program, it may be worth considering supplemental ingredients containing food. (H. Hussein & S. Mohamed 2009)

(Kh. Samia, 2008). says that dietary supplements are a formula derived from natural, animal, vegetable or other food ingredients, which are present in various forms (tablets, capsules, liquids, powders) To increase the proportion of the body or muscle cells to obtain the necessary energy or to increase the size of the muscle cell and according to the effectiveness of specialization to obtain the highest achievement. The components of dietary supplements are based on specific percentages of the substance they contain and may contain one or more substances.

The discovery of the importance of Boron began only in the 1980s, but the relationship with the gain of muscles is even more recent. And it was from this moment that this mineral gained the spotlight between the guys who train hard and who fight daily for an insane shape.

First, they discovered that Boron acts in the regulation of other minerals within the human body. After that, that influenced bone health.

Boron is found in fruits, vegetables, tubers and oilseeds. It is also in smaller amounts in meats and other animal products, grains and seasonings.

It is estimated that the habitual consumption of the Brazilian population is 0.934 mg of boron per day - less than 10% of the amount presented in the study that proved the benefits of Boron for those who want to gain muscle mass.

Boron is found naturally in the environment, plants absorb it from the soil because it is essential for its growth, and humans achieve it thanks to the consumption of plant-based foods such as fruits and vegetables (The human body contains about 0.7 mg per kilo of boron weight).

Boron is found especially in dried fruits such as plums and apricots, also in soya, nuts, wine and beer. Boron has been found in animal tissues, although it does not appear to accumulate in enough quantity.

This is because most foods do not contain high amounts of Boron. To achieve the study's 10 mg goal, you would need to eat:

45 apples red; or
5.4 kg broccoli; or
24 glasses of grape juice; or
13 carrot; or
430g of almonds.

That is why, if your goal is to use Boron in favor of your physical development, the best route is supplementation.

Better, not: unique. Because the other option would be eating all day - which would compromise your workout and your diet, preventing any result.

(MR. Naghii, 1999)mentions that boron is the effect of the nutrient component and has shown that boron supplementation has increased the concentration of steroid hormones in blood plasma and has led to a significant increase in the concentration of 17-beta (17-B-Estradiol) ($P < 0.004$). Testosterone increased in plasma (T) and T / E2 increased significantly. However, there was no disturbance in plasma lipids.

testosterone is key to increasing lean mass and developing muscle. So, of course Boron's performance is interesting to those who have those goals.

(H. Hussein & S. Mohamed 2009) emphasizes that the main goal of muscle strength training is to try to reach the highest level possible in sports competitions to win competitions. The athlete develops muscle strength through weight training, which is one of the best ways to develop the physical elements that work on To increase muscular capacity as well as improve athletic performance and adds that training with heavier the fastest way and the best way to grow muscle and prepare for work and is the best means of training and effective goal to equip the individual fitness overall fitness.

Most studies have agreed that weight training increases muscular capacity and a small percentage indicates that this increase is accompanied by short muscles and restricted movement of the joint. However, research results indicate that this can be modified with special flexibility exercises. It is known that swimming alone does not develop the muscle strength required for players to achieve maximum performance, and as a result, muscle strength is developed with more difficult resistance, which can be achieved by weight training.

(H. Hussein & S. Mohamed 2009) report that exercise, renews muscle tissue and helps in the structure of hormones that provide anaerobic interactions, and increases the formation of muscle

actin and myosin in the muscle if the pressure is severe.

(C.D. Hunt & J.P. Idso, 1999) reported that there was a difference in the results of research and studies conducted in this field. There was some discrepancy regarding the increase of the hormones of the genitourinary genitals, especially the hormone (Fsh) Follicle stimulating hormone, hormone L (Luteinizing Hormone L), during physical training or not.

More and more studies and research have come and, among them, the main finding - or at least main for who trains: Boron can increase free testosterone.

Therefore, the aim of this investigation was to explore the effect of boron supplementation on free testosterone activity in the blood during muscle strength training of volleyball players

Methods

Sixteen volleyball players, Eltayaran club, divided into two groups. The experimental group (n = 8) take boron supplement contains boron mineral salts the boron supplement has been taken in a daily dose (2MG) in the last 4 weeks in the program for the experimental group. In the days that there is no weight training, In the morning after breakfast and in the days when weight training was done, two doses were used in the morning after breakfast and one in the meal, which precedes the training, based on the expert opinion. and control group (n = 8) (placebo) performed traditional exercise. Subjects were required to read and complete a health questionnaire and informed consent document; there was no history of injuries, diabetes or recent surgery.

Experimental Approach to the Problem

Two groups (experimental and control) performed a pre and post - The researchers followed the experimental group with weight exercises for 12 weeks and the boron supplement was taken for 4 weeks.

Conditions of sample selection:

Gestational age 5.80 ± 1.47 (year), free testosterone before and after exertion (rest time), (after training), age 19.6 ± 8430. (Year) Respectively 18.79 ± 3.05, 20.02 ± 2.91 (mg / ml)

Boron is a mineral necessary for the human body, especially to maintain strong bones and joints, but it is in debate and study whether it is an essential mineral for human beings. It can be found in different forms such as, for example, sodium borate, boron chelates or sodium tetraborate decahydrate.

The boron supplement contains boron mineral salts and is one of the rare mineral salts proven scientifically. It works to increase the hormone. The boron supplement has been taken in a daily dose (2MG) in the last 4 weeks in the program for the experimental group. In the days that there is no weight training, In the morning after breakfast and in the days when weight training was done, two doses were used in the morning after breakfast and one in the meal, which precedes the training, based on the expert opinion

Testing Procedures

1- Measurements were carried out in the study variables of the two study groups. Blood samples were withdrawn by a specialist before performance.

2- A high-intensity training module was carried out from the weight-bearing training for the sample and RM1 for the sample.

3- Blood samples were withdrawn by a specialist doctor after the performance directly.

Training method used:

The researcher used the interval method of 12) weeks as a period to implement the proposed program with a load of (3) three units per week for each unit of (50) - (70) minutes. The program consists of three periods each period consists of (4) The average of the high and then the maximum at the end of the program and the distribution of the load in the primitive on the strength training without weighting and weight training exercises to deliver weight training at the end of the program to 80% without burdening 20% of the time and intensity of the program.

Statistical analysis

All statistical analyses were calculated by the SPSS statistical package. The results are reported as means and standard deviations (SD). Differences between two groups were reported as mean difference ±95% confidence intervals (mean diff ± 95% CI). Student's t-test for independent samples was used to determine the differences in fitness parameters between the two groups. The $p<0.05$ was considered as statistically significant.

Results

Table 1. Anthropometric Characteristics Training experience of the Groups (Mean ± SD)

Group	N	Age [years]	Weight [kg]	Height [cm]
Experimental	8	19.17 ± 0.4	79 ± 2.87	184 ± 3.67
Control	8	19.09 ± 0.6	78 ± 3.43	182 ± 4.11

Table 1 shows the age and anthropometric characteristics of the subjects. There were no significant differences observed in the anthropometric characteristics for the subjects in the different groups.

Table 2. Mean ± SD and "T" Test between the two Groups (experimental and control)
In testosterone concentration

Mean ± SD	Experimental group	Control group	Significance
Free Testosterone atrest	18.27±2.23	18.19 ±0.21	NS
Free TestosteroneAfter effort	22.89±0.18	18.99 ±0.08	S

Table 2 shows that Significant Difference between the experimental group and control group in Free Testosterone After effort for posttest to the experimental group. No Significant DifferenceFree Testosterone at rest.

Table 3. Mean ± SD and "T" Test between the two Groups (experimental and control)
In strength variables.

Mean ± SD	Experimental group	Control group	Significance
Leg Static strength	75.28±4.09	72.11±2.47	S
Back Static strength	55.11 ± 4.15	52.24±3.76	S
Vertical Jump	44.24± 2.64	48.66± 2.82	S
Seated Medicine Ball Throw	7.96±0.3	6.61±0.12	S

Table 2 shows that Significant Difference between the experimental group and control group in Leg Static strength
Back Static strength, Vertical Jump, Seated Medicine Ball Throwfor posttest to the experimental group.

Discussion

That testosterone hormone is an important role in muscle growth, which is considered the factor influencing the increase in muscle inflation in men compared to women if both of them implement the same training program, testosterone is not only responsible for the inflation of muscle, but there is also the proportion of testosterone to the hormone. The higher the estrogen, the greater the muscle There were statistically significant differences between the mean of the experimental group and the control in the free testosterone variable after the effort in the direction of the dimensional measurement, indicating that there are statistically significant differences in favor of the distance measurement of the first experimental group.(JL. Copeland, et al. 2002).

The increase in free testosterone by Boron has been proven in a scientific study conducted in 2011 by the Journal of Trace Elements in Medicine and Biology[1]. That's why everyone who trains in search of an insane shape needs to pay attention to this mineral.(AA. Ferrando, NR. Green, 1993)

The advantages of Boron supplementation go beyond the increase in free testosterone and the gain of muscle mass. The mineral offers several other health benefits, all scientifically proven.

In addition, Boron assists in the modulation of the immune and inflammatory process, reducing symptoms such as inflammation, pain and edema, as shown in this study published in the Journal of Trace Elements in Medicine and Biology (C.D. Hunt & J.P. Idso, 1999) With this, Boron supplementation can aid recovery and improvement of the immune system.

of course, it is much easier to obtain the amounts needed to obtain this effect through supplementation than consuming Boron through "conventional" food, since food does not have large amounts of the mineral.

Results are consistent with the study of (NR. Green & AA. Ferrando 1994; TV. Bhasker, et al. 2017; TA. Armstrong & JW. Spears. 2001). which is the most important result is the rise of testosterone.

The results are not consistent with the study of (K. Karkoulisa, et al. 2008) The most important of which is the absence of statistically significant results in testosterone.

The results are consistent with the study of (FH. Nielsen, et al.1987)the most important of which is the absence of statistically significant results in free testosterone.

Conclusion

our data suggest that (4) weeks boron supplementation could improvement of Free Testosterone After effort, Leg Static strength, Back Static strength, Vertical Jump, Seated Medicine Ball Throw in volleyball players.

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