

# USE OF NUTRITIONAL SUPPLEMENTS BY HIGH SCHOOL FOOTBALL AND VOLLEYBALL PLAYERS

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## ABSTRACT

The known use of performance enhancing agents by athletes has occurred throughout history. In the 1960s and 1970s steroids and amphetamines were the supplements most often used. Now athletes are turning to supplements that are either natural or stimulate the release of natural hormones. The purpose of this study is to evaluate the prevalence of use of nutritional supplements among high school football and volleyball players. This study surveyed 495 male football players and 407 female volleyball players from 20 high schools in Northwest Iowa. These athletes completed anonymous surveys and returned them to their coaches. Results showed that 8% of the male athletes and 2% of the female athletes were using supplementation. Supplements used included creatine, androstenedione, HMB, amino acids, DHEA, phosphogen, weight gainer 1850, Tribulus, muscle plus, multivitamins, calcium, GABA, and Shaklee Vita Lea and Physique.

## INTRODUCTION

The use of nutritional supplements has been a controversial subject in past years. In the 1960s and 1970s, anabolic/androgenic steroids and amphetamines were at the forefront.<sup>10</sup> Now many athletes are trying to improve their performance by supplementing their diets with so-called natural substances. Some of the major supplements being used for performance enhancement include: creatine, androstenedione, beta-hydroxy-beta-methylbutyrate (HMB), amino acid complexes, dehydroepiandrosterone (DHEA), ginseng, and phosphogen.

Creatine, which is an amine, is a natural dietary constituent present in small amounts in animal foods.<sup>9</sup> Creatine can also be synthesized in the liver and kidney from several amino acids.<sup>9</sup> Research suggests that consuming 20 grams of creatine per day (5 grams fed four times daily) for five days may improve performance in brief, maximal exercise lasting less than 30 seconds.<sup>2</sup> However, two recent studies did not find any improvement in running<sup>4</sup> or swimming sprints<sup>1</sup> after creatine supplementation. Using creatine supplementation may be detrimental to performance in aerobic events because of the increase in body mass found with creatine supplementation.<sup>9</sup> An increase in body mass has been found consistently with creatine supplementation, but the mass is not necessarily lean muscle tissue. The weight gain is possibly water weight, which has bound to the creatine. Weight is put on quite rapidly, and in some cases urine production decreases with the creatine usage which would suggest water retention.<sup>9</sup> The use of creatine does not appear to have any short-term health risks, but long-term risks have not yet been determined.<sup>9</sup>

Androstenedione is a nutritional supplement that converts into testosterone once ingested.<sup>5,6</sup> Anabolic steroids are different from androstenedione in the fact that they are man-made testosterone,<sup>11</sup> while androstenedione stimulates the release of the natural hormone testosterone. But this testosterone is released in amounts excessive to what the body normally produces. Very little scientific research is available on androstenedione. Long-term studies have not been done on its safety or ergogenic effects.

Beta-hydroxy-beta-methylbutyrate (HMB) is used primarily to increase lean muscle mass and/or decrease fat.<sup>9</sup> The exact function of HMB in the body is unknown.<sup>6</sup> The normal source of HMB production in the body is leucine, which is a natural amino acid constituent of dietary protein.<sup>9</sup> Well-controlled studies are needed to determine the effectiveness of HMB in humans. HMB supplementation appears to be safe acutely,<sup>9</sup> but further long-term studies on humans are needed.

The claim behind amino acid supplements is that they stimulate the release of human growth hormone, pro-

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mote muscle growth, and increase strength. The fact is that oral amino acid supplements do not increase growth hormone levels or muscle mass. Weight lifting and endurance training both significantly increase growth hormone levels. Combining the supplements with exercise does not increase growth hormone levels above those seen with exercise alone.<sup>3</sup>

Dehydroepiandrosterone (DHEA) is a precursor to the hormones testosterone and estradiol.<sup>6</sup> It is a natural steroid produced by the adrenal gland.<sup>9</sup> Levels of DHEA peak in early adulthood and decrease with age, which is why it is often called a “youth hormone.”<sup>6</sup> There is no evidence that DHEA produces anabolic effects (e.g. increased muscle mass or strength), or decreased body fat in healthy, young adults.<sup>8</sup> Side effects include acne, extra growth of body hair and breast tenderness in women, lowered cortisol levels, irritability, and rapid heartbeat.<sup>6</sup> Most human studies have reported no major adverse side effects acutely, but abnormal findings such as increased facial hair and decreased levels of HDL cholesterol (the good cholesterol) have occurred in women.<sup>9</sup> The hormone’s long-term safety has not been established<sup>9</sup> and, as with other hormones, adverse effects may not appear for years.

Ginseng is a term used for a variety of natural chemical extracts derived from the Araliaceae plant family.<sup>9</sup> No other drug has all the healthful properties that have been attributed to ginseng. The existence of a genuine “cure-all” is unlikely. Until proper research has been conducted, claims that ginseng has medicinal value should be considered unproven. Triterperoid saponins are thought to be responsible for whatever pharmacological activity ginseng might possess. Since the ginseng root is expensive, the commercial preparations (extracts, powders, teas, or paste) may contain little or no ginseng. The best-documented side effects of ginseng are insomnia, and to a lesser degree, diarrhea and skin eruption.<sup>7</sup> Scientific research on ginseng does not support the effectiveness of it as a sports performance enhancer.<sup>9</sup> The prolonged use of ginseng seems to be relatively safe.<sup>7</sup>

#### MATERIALS AND METHODS

Four hundred ninety-five male football players and 407 female volleyball players from 20 high schools in Northwest Iowa were used in this study. Of those athletes, 31% (278) were freshmen, 24% (215) were sophomores, 25% (223) were juniors, and 20% (186) were seniors. Anonymous surveys were distributed to each of these athletes and collected by their respective coaches.

#### RESULTS

Of the 902 athletes surveyed, a total of 49 athletes (5%) were using some sort of nutritional supplementation. In regard to the 495 male athletes, 42 (8%) were using supplements. Of the 407 female athletes, seven (2%) were using supplementation. Some of these athletes were taking supplements in a combination of two or more at a time.

<i>Supplement</i>	<i># using</i>	<i>% using</i>
Creatine—Males and Females	29	3%
Creatine—Males	28	6%
Creatine—Females	1	<1%
Androstiendione—Males and Females	3	<1%
Androstiendione—Males	3	<1%
Androstiendione—Females	0	0%
HMB—Males and Females	3	<1%
HMB—Males	3	<1%
HMB—Females	0	0%
AA Complex—Males and Females	14	2%
AA Complex—Males	13	3%
AA Complex—Females	1	<1%
DHEA—Males and Females	1	<1%
DHEA—Males	1	<1%
DHEA—Females	0	0%
Phosphogen—Males and Females	3	<1%
Phosphogen—Males	3	<1%
Phosphogen—Females	0	0%

#### CREATINE

Of the 495 males surveyed, 28 (6%) reported using creatine. Ten of those users had been using for 1-3 months, six had been using for 4-6 months, two had been using for 7-9 months, four had been using for 10-12 months, three had been using for 1-1.5 years, one had been using for 1.5-2 years, one had used for 2-3 years, and one of the users did not answer the question about length of use. Thirteen of the users took creatine by cycling, ten took continuously, three took as needed, and two did not answer the question concerning how they took the supplement. When asked about their daily dosage of creatine, three answered one a day, two said three daily, two said one spoonful a day, two said one teaspoon a day, two said one tablespoon a day,

<i>Supplement</i>	<i># Taking Continuously</i>	<i># Cycling</i>	<i># Taking As Needed</i>	<i>Unsure</i>
Creatine—Males and Females	11	13	3	2
Creatine—Males	10	13	3	2
Creatine—Females	1	0	0	0
Androstiendione—Males and Females	1	1	1	0
Androstiendione—Males	1	1	1	0
Androstiendione—Females	0	0	0	0
HMB—Males and Females	0	2	1	0
HMB—Males	0	2	1	0
HMB—Females	0	0	0	0
AA Complex—Males and Females	8	5	1	0
AA Complex—Males	7	5	1	0
AA Complex—Females	1	0	0	0
DHEA—Males and Females	0	1	0	0
DHEA—Males	0	1	0	0
DHEA—Females	0	0	0	0
Phosphogen—Males and Females	0	2	1	0
Phosphogen—Males	0	2	1	0
Phosphogen—Females	0	0	0	0

one said two tablespoons a day, one said 2-3 tablespoons a day, one said one cup a day, one said five milligrams a day, one said 500 milligrams a day, two said five grams daily, one said 36-50 grams a day, and nine did not answer the question. Twenty-two users bought their creatine at GNC, two bought at an athletic club or fitness center, two bought both at GNC and a discount store, one marked that he bought at a source other than those listed in the survey, and one did not answer the question concerning where he purchased the creatine. When asked how much they spent on nutritional supplements per month, ten said \$0-\$25, eight said \$26-\$50, five said \$51-\$75, three said \$75-\$100, and two did not answer that question. Twenty-two of the male athletes listed performance enhancement as the reason for taking creatine, one said he took creatine for dietary supplementation, one said he took for both performance enhancement and dietary supplementation, and four did not list a reason for taking creatine.

There was only one female athlete taking creatine. She was taking creatine in the form of Advocare's performance optimizing system 2. She had been taking between 1-3 months continuously in the dosage of two

grams per day in the form of a drink. She purchased the creatine through an Advocare salesperson and was spending \$26-\$50 per month. She had learned about supplementation from her parents, coach, orthopedic surgeon, and an athletic trainer. Her reason for using nutritional supplements was for performance enhancement and to stay healthy (she was also using multivitamins).

#### **ANDROSTIENDIONE**

None of the female athletes and three of the male athletes surveyed took androstiendione. All three had been taking for 4-6 months with one using in cycles, one said he took continuously, and one said he took as needed. The amount of androstiendione these athletes took was the following: one took two a day, one took 200 milligrams a day, and one took 500 milligrams a day. Two of these athletes bought their androstiendione at GNC and one bought from an Advocare salesperson. One spent \$26-\$50 a month, one spent \$51-\$75 a month, a one spent more than \$125 a month. All three of the athletes used androstiendione for performance enhancement.

<i>Supplement</i>	<i># Taking to Enhance Performance</i>	<i># Taking to Enhance Diet</i>	<i># Taking for Both</i>
Creatine—Males and Females	22	1	2
Creatine—Males	22	1	1
Creatine—Females	0	0	1
Androstiendione—Males and Females	3	0	0
Androstiendione—Males	3	0	0
Androstiendione—Females	0	0	0
HMB—Males and Females	3	0	0
HMB—Males	3	0	0
HMB—Females	0	0	0
AA Complex—Males and Females	11	1	1
AA Complex—Males	11	1	0
AA Complex—Females	0	0	1
DHEA—Males and Females	1	0	0
DHEA—Males	1	0	0
DHEA—Females	0	0	0
Phosphogen—Males and Females	3	0	0
Phosphogen—Males	0	0	0
Phosphogen—Females	0	0	0

**BETA-HYDROXY-BETA-METHYLBUTYRATE (HMB)**

None of the female athletes and three of the male athletes surveyed took HMB. Two of the male athletes took HMB for 1-3 months and one took for 1-1.5 years. Two of the males cycled their HMB usage while one used as needed. One of the athletes took HMB in the dosage of two packets a day, one took 250 mg a day, and one took five grams a day. Two of the males bought their HMB at GNC and one's parents purchased it for him. Two spent \$51-\$75 per month, and one spent \$76-\$100. All three of the athletes were using HMB for performance enhancement.

**AMINO ACID COMPLEX**

Thirteen of the male athletes were taking an amino acid complex. Four had been taking for 1-3 months, four were taking for 4-6 months, two were taking for 7-9 months, two were taking it for 10-12 months, and one was taking for 1-1.5 years. Five were taking in cycles, seven were taking continuously, and one was taking as needed. When asked their daily dosage, four didn't

know, two said one serving a day, two said two daily, one said three daily, one said after every lifting session, one said two scoops a day, one said one cup a day, and one said three cups a day. Ten of the athletes bought their amino acid complex at GNC, one bought at both GNC and a discount store, one bought from an Advocare salesperson, one bought from an athletic club or fitness center. Five were spending \$0-\$25 per month, three were spending \$26-\$50, three were spending \$51-\$75, one was spending \$76-\$100, and one was spending more than \$125 per month. Eleven were using for performance enhancement, one was using as a dietary supplement, and one did not disclose why he was using an amino acid complex.

One female athlete was taking an amino acid complex. She had been taking from 1-3 months continuously in the dosage of 25-50 grams per day. She bought from both GNC and an Advocare salesperson and spent between \$76-\$100 per month. She was using the supplement as both a dietary supplement and for performance enhancement.

### DEHYDROEPIANDROSTERONE (DHEA)

Only one athlete took DHEA. This athlete was a male who had been taking for 1-3 months in cycles, he purchased his supplements at GNC, he spent between \$76-\$100, and he was using for performance enhancement.

### GINSENG

Four male athletes were using Ginseng with two using for 1-3 months and two using longer than three years. Two cycled their ginseng use and two used continuously. Two athletes were taking one pill a day and two did not know how much they were taking, two bought at GNC, one's parents bought for him, and one bought at both GNC and a discount store. All four of the athletes answering said they used ginseng for performance enhancement.

### PHOSPHOGEN

Three male athletes reported using phosphogen. Two of these athletes said they had been taking from 1-3 months and one said he had been taking 1-1.5 years. Two were taking phosphogen in cycles while one was taking as needed. They all purchased their phosphogen at GNC. Two spent between \$51-\$75, and one spent \$76-\$100. All three athletes were using phosphogen for performance enhancement.

### OTHER SUPPLEMENTS

There were other supplements used by the male athletes that were not specifically listed in the survey. One male athlete had been taking weight gainer 1850, one was taking Tribulus, one was taking Muscle Plus, four were taking multivitamins, one was taking calcium supplementation, one was taking Gamma-Aminobutyric Acid (GABA), and one was taking Shaklee Vita Lea and Physique.

Of the female athletes surveyed, two were taking multivitamins, two were taking echinacia, three were taking calcium, and one was taking a whey and protein drink.

### DISCUSSION

Previous research on the incidence of nutritional supplement usage in the high school population is at best limited. This study was done to get a baseline on nutritional supplement usage by high school football and volleyball players in Northwest Iowa.

The results of this survey revealed the widespread use of nutritional supplements, especially creatine, for performance enhancement by male athletes. Athletes are pushing the limits of athletic performance by using whatever resources they have to improve their performance, even at the high school level. Some nutritional

supplements do enhance certain sports performances, but until these supplements have been scientifically proven to not cause adverse short- and long-term effects, they should not be taken.

The female use of nutritional supplementation was primarily for dietary enhancement. This use of multivitamins, iron, calcium, etc., can be very beneficial for athletes whose diets are lacking in any of the previously mentioned substances. But, if an athlete's diet is sound in all areas, no supplementation is necessary.

The cost of nutritional supplements can be quite expensive. Although many (28) of the athletes we surveyed were only spending between \$0-\$50 per month, there were three athletes who spent in excess of \$125 per month. Another troubling issue is that the FDA does not regulate what is in many of the nutritional supplements we researched, so these expensive products may not do, or contain what they claim. As discussed earlier, most of them have no scientific research to prove their value or long-term effects.

As health care providers, we need to educate our patients on nutritional supplementation. Calcium, iron, multivitamins, etc., can be of great benefit for patients whose diets are lacking. Health care providers should evaluate the patient and make recommendations based on their findings. The use of "performance enhancing" supplements should be discouraged until there is long-term studies that prove their safety and efficacy.

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