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Policies and Sports-Enhancing Supplements in Adolescents: Could What We Don't Know Hurt Them?

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Introduction

Doctors of chiropractic (DCs) are the most visited of the health care clinicians known as complementary and alternative (CAM) providers.¹ DCs commonly treat athletes and adolescents mainly for musculoskeletal problems such as neck and back pain.² There are DCs specifically certified in chiropractic college programs, however, who treat sports injuries.³

In addition to treatment of injuries, the Job Analysis of Chiropractic, performed by the National Board of Chiropractic Examiners, indicates a high percentage of DCs provide nutritional advice.² Walker, et al. found that the majority of doctors of chiropractic they surveyed who reported giving nutritional advice did so in the form of recommending nutritional supplements.⁴ This paper is aimed at providing information to DCs and other clinicians about the use of performance-enhancing supplements among adolescent athletes.

Methods

We reviewed various databases and organizational sites for policies or articles about policies on supplement use in adolescents for the enhancement of sports performance. We searched PubMed, MANTIS, SportDiscuss and various organizations for their policy on the subject. Search terms included adolescents and nutritional supplements; sports-enhancing supplements, and youth sports or adolescent athletes in various combinations. We comment on the literature regarding studies on supplement use by these athletes and the policies we could identify.

Discussion

Most people see nutritional supplements as harmless natural substances.⁵ Because they can be purchased legally at health food stores, drugstores, and on the Internet, these products have become a popular sports-enhancement tool among many adolescent athletes. It is estimated that 60%-



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80% of adolescent athletes consume supplements.^{6,7} The types of products consumed vary greatly. Creatine, androstenedione, and protein are some of the most common.⁸ Reasons for adolescent supplement use include perceived health benefits, illness prevention, energy boost, and increased sports performance.⁹ Despite the increased reliance on these nutritional substances, many adolescents are not aware of the potential short-term and long-term risks.⁹

The most popular supplement among adolescent athletes is creatine. It is used as a sports-performance enhancer to increase energy through phosphocreatine generation, which in combination with regular high-intensity resistance training, can increase muscle mass and strength.¹⁰ Studies examining immediate effects have shown that creatine can improve high-intensity, short-term activity.^{10, 11} Although some studies show that short-term use may have minimal risks,^{11, 12} other studies suggest potential health risks of continued use, such as a possible link between creatine use and hypertension, cardiomyopathy, increased muscle cramps, and dehydration.^{10, 12-14} Despite what is known about the effects of creatine, no studies have been done examining adolescents. In addition, the long-term health impact is unknown.

When former Major League Baseball slugger Mark McGwire was interviewed with a bottle of androstenedione visible in his locker, the popularity of this supplement began to rise. “Andro,” as it is commonly referred to, is a precursor to testosterone used among athletes to promote muscle mass and strength in combination with strength training.^{6, 14, 15} Despite popular belief in these benefits, studies have

shown that use of andro does not show an increase in mass, strength, or athletic performance.¹⁶⁻¹⁸ Increased use of andro, however, may be linked to major health risks similar to those related to anabolic steroid abuse.^{6, 14} As with creatine supplementation, studies have not examined adolescent use, so the potential for age-specific adverse effects is unknown.

Protein, essential for normal body functioning, should be a part of anyone’s healthful nutritional plan. Due to increased activity levels and increased need for energy, protein supplementation has become popular among young athletes.¹⁹ The potential benefits of protein supplementation include increased muscle growth, improved endurance, and enhanced sports performance.¹⁹⁻²¹ A potential problem with protein supplementation is exceeding the normal dosage. A normal dosage should not surpass 2.0 g/kg/d because no athletic gain is found with high quantity.⁶ Studies have not revealed any serious side effects with appropriate protein supplementation. It is indicated; however, that caution should be exercised by persons with kidney disease because excess doses of protein may potentially increase health risks.²²

Position Statements and Existing Guidelines

In general, a growing concern exists in health care regarding the use of dietary supplements among adolescent athletes. The American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine released a joint position statement citing medical evidence that adequate food intake is sufficient to maintain body weight.²³ Adolescent athletes, however, continue to consume supplements to increase body weight and en-



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hance sports performance.²⁴ A substantial amount of research has been conducted on supplements such as creatine, protein, and amino acids, but few or no studies examine the effects of such substances on an adolescent population. Despite the lack of science, some health care providers continue to prescribe or suggest dietary supplements to adolescent athletes. Although coaches, trainers, parents, and peers may be sources of information on enhancing supplements, Scofield and Unruh²⁴ found that the coach was the person the athlete felt was most knowledgeable. A 1998 press release from the National Federation of State High School Associations' (NFSHSA) Sports Medicine Advisory Committee stated, however, "In order to minimize health and safety risks to student-athletes, maintain ethical standards, and reduce liability risks, school personnel and coaches should never supply, recommend, or permit the use of any drug, medication, or food supplement solely for sports-enhancing purposes."²⁵ In its 2003 position statement, the NFSHSA²⁶ strongly recommends that all student-athletes and their guardians consult with their health care providers prior to using any nutritional supplement. With this responsibility placed on DCs, physicians, nurse practitioners, and other health care providers, it is essential that the practitioner become aware of the possible side effects of these substances. In addition to exposing the patient to potential short-term and long-term adverse health effects, practitioner liability also increases.

Enhancing Supplements: Use, Misuse, Misguidance

According to the NFSHSA, in the academic year 2002-2003 there were more than 6.8 million participants in U.S. high school athletics, representing 55.4% of the

high school population.²⁷ A 2003 study by the BlueCross BlueShield Association estimated that more than 1.1 million adolescents ages 12-17 have used performance-enhancing supplements or drugs.²⁸ Of those, 76% could not identify any dangers from using these substances. Prior studies indicate that coaches, perhaps most trusted by the child, may be the least capable of providing sound nutritional advice.²⁹

In addition to the joint position statement mentioned above, the American Academy of Pediatrics has taken a critical stance on this issue by clearly stating, "The American Academy of Pediatrics strongly condemns the use of performance-enhancing substances and vigorously endorses efforts to eliminate their use among children and adolescents."³⁰

Current assessment of the American Chiropractic Association's (ACA) councils and policy statements does not indicate a specific policy on enhancing supplements in adolescent athletes or others. There are statements, however, suggesting that it is part of chiropractic practice to advise on nutritional supplement and vitamin use.³¹ In addition, a recent ACA "Healthy Living" patient information flyer regarding keeping young athletes healthy states that kids should "avoid trendy supplements."³²

A great deal of literature on supplement use and misuse has been published. There is also a significant amount of specific literature on supplements used for enhancing athletic performance. This paper reviews pertinent literature that addresses enhancing supplement use in adolescent athletes in particular. The Centers for Disease Control and Prevention define adolescents, however, as persons aged 14-24 years.³³ This extends into the age range of intercol-



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legiate athletes. Those athletes are under close scrutiny by coaches, trainers, and other officials that regulate sports. This review is aimed toward clinicians who treat or advise younger athletes, but clinicians who treat highly skilled athletes, including participants in intercollegiate activities, should also be aware of what is reported in the literature and policy or regulatory statements.

Herbold, et al.³⁴ reported on a survey of 362 high school students in Massachusetts and found that 74% had used some type of supplement, with vitamin C being the most commonly used in 47.3% of students.

There was a positive correlation between the number of supplements of any type and the number of team sports played. When controlling for gender, males were more likely to take supplements when participating in sports. Besides vitamins, ginseng was the most common herbal supplement, and amino acids and creatine were the most commonly used sports supplements. The adolescents in the study reported they were introduced to supplement use by family, friends, and physicians, with 52% stating they did so to enhance health, 36% to provide energy, and 24% to increase muscle mass. Males were statistically more likely to report a desire for muscle mass when compared with females.

In the assessment of Nebraska athletes reported in the *Journal of Strength and Conditioning* in 2006, Scofield and Unruh²⁴ found that a higher number of male athletes used supplements and 38.1% said the coach was their best source of information on supplements. The authors contend that supplement industry advertising targets adolescent males and that a majority of younger athletes have used supplements to

enhance athletic performance. Among the 9 high schools in Nebraska surveyed, male athletes made up 71.2% of the sample and 22.3% of all respondents reported current use of a dietary supplement. A supplement was taken in the past by 27.3%, and significantly more males than females reported use. After the coach, students said a fitness club or health store clerk, followed by magazines, were their best sources for information on supplement use. When asked if they would be interested in a health professional speaking to them about supplement use, 56.8% said they would. The most popular supplement used was meal-replacement protein supplements (23.7%), followed by vitamin-mineral supplements (19.4%) and creatine (16%).

In a recent survey of female college cross-country runners, a convenience sample (n=60) survey of 6 colleges in Michigan and Illinois findings indicated participants lacked basic nutritional knowledge and were not capable of appraising critical risks to nutrition-related health problems.³⁵ The investigators found that the top 4 reported sources of nutritional information were magazines, parents, coaches, and teammates. Only 17% cited their athletic trainer as a source and fewer than half said their doctor was a source of information.

A study by Spear in Alabama in 1994 found that 32% of coaches at the high school level recommended protein supplements and had obtained their information mostly from lay health and fitness magazines.³⁶ Sixty-two percent had instructed students to take vitamin and mineral supplements, but almost 50% could not identify dangerous side effects of supplement use. A later assessment of coaches found that they felt responsibility for providing nutritional knowledge to players,



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but when assessed about general nutrition knowledge, they scored an aggregate average of 59%.³⁷ Therefore, the researcher concluded, coaches may not be the best sources of information on supplement use.

Winterstein and Storrs³⁸ state that athletes demonstrate a greater willingness to take supplements than non-athletes and that the trainer is often called on to advise in the area of supplement education. They contend that it is the responsibility of the trainer to make the athlete understand that even natural supplements may not be safe or legal to use in sports and that the sports medicine team should provide honest, unbiased information regarding supplements. Certainly, clinicians advising and treating athletes should do no less. A factor that cannot be over-stressed with athletes and parents, when appropriate, is that most of the products to enhance performance have not been tested for safety, or approved for use among adults, much less adolescent participants.³⁹

Chiropractic Sports Medicine's Expert Opinions

In a 1997 text on management of sports injuries, the DC editors cover nutritional considerations in chapter 18 and conclude that there is little scientific evidence, in general, for the use of enhancing supplements in all athletes.⁴⁰ Later, in *Sports Chiropractic*, a text dedicated to chiropractic management of sports injuries, Gengenbach and Hunter cover the topic of sports nutrition. They state that athletes are always looking for ways to enhance performance and though individual needs may vary, no scientific evidence supports the use of supplements to enhance performance. They add that concerns about safety should be considered along with sound nutrition choices specific to the ath-

lete.⁴¹ Table 1 contains a list of existing policies regarding sports supplements in adolescents.

Chiropractors may be the only providers an athlete sees for care of an athletic injury and certainly may be seen as having added knowledge of nutrition or nutritional supplements based on evidence that recommendation is common in this provider group.² Generally, chiropractors and all providers should consider the following in order to take a patient-centered approach with adolescents who might use supplements in sports;

- Become familiar with brand names of common sports supplements.
- Take a thorough history of each patient regarding not only current medications but current supplement use, including sports-enhancing supplements.
- Make all patients and parents of adolescent patients aware of the potential risks of supplements that may be advertised for sports enhancement.
- Advise that proper diet during training and athletic participation be followed and that healthy eating patterns are important to overall health and healthy athletic performance.
- Be prepared to discuss policies of various lead organizations on the subject of supplement use in athletes, particularly adolescents.

Conclusion

Doctors of chiropractic commonly recommend nutritional supplements and give nutritional advice to patients. They are probably perceived by most to be credible sources of health information on this subject. In addition, athletes, including those participating in youth sports programs, will likely continue to use supplements



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that give them a perceived advantage in athletic competition. Doctors of chiropractic and other clinicians who treat athletes, particularly adolescents, should be informed and prepared to advise and educate patients, parents, and coaches on the po-

tential dangers of misuse of sports-enhancing supplements. Organizations representing DCs should formulate policies on supplement use in adolescent athletes so practitioners are clear on what is, and is not, indicated regarding their use. ■

Table 1. Position Statements

American Dietetic Association	<ul style="list-style-type: none"> • Athletes will not need vitamin and mineral supplements if adequate energy to maintain body weight is consumed from a variety of foods.²³
Dietitians of Canada	<ul style="list-style-type: none"> • Nutritional ergogenic aids should be used with caution, and only after careful evaluation of the product for safety, efficacy, potency, and whether or not it contains banned or illegal substances.²³
American College of Sports Medicine	<ul style="list-style-type: none"> • Nutrition advice, by a qualified nutrition expert, should only be provided after carefully reviewing the athlete's health, diet, supplement and drug use, and energy requirements.²³
American Academy of Pediatrics	<ul style="list-style-type: none"> • Strongly condemns the use of performance-enhancing substances and vigorously endorses efforts to eliminate their use among children and adolescents.³⁰
National Federation of State High School Associations' Sports Medicine Advisory Committee	<ul style="list-style-type: none"> • School personnel and coaches should never supply, recommend, or permit the use of any drug, medication, or food supplement solely for sports-enhancing purposes.²⁵ • Strongly recommends that all student athletes and their guardians consult with their health care providers prior to using any nutritional supplement.²⁶

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